250139

JPRS 75950

27 June 1980

West Europe Report

SCIENCE AND TECHNOLOGY

No. 25

FBIS FOREIGN BROADCAST INFORMATION SERVICE

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

71
A04

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available from Bell & Howell, Old Mansfield Road, Wooster, Ohio 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 75950

27 June 1980

WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

No. 25

CONTENTS

INTERNATIONAL AFFAIRS

EEC Approves Funds for Promotion of Solar Energy
(AFP SCIENCES, 17 Apr 80)............................ 1

EEC Allocates Over 5 Billion Francs for Research in 1980-83
(AFP SCIENCES, 20 Mar 80)............................ 2

International Accord to Study Fluidized-Bed Combustion
(INDUSTRIES & TECHNIQUES, 10 Mar 80)................. 6

Six European Auto Makers Join in Research
(AFP SCIENCES, 24 Apr 80)............................ 7

FEDERAL REPUBLIC OF GERMANY

Large Increase in Funds for R & D Noted
(AFP SCIENCES, 17 Apr 80)............................ 8

Renewable Energy Sources Surveyed
(M. Meliss; BWK: BRENNSTOFF-WAERME-KRAFT, Apr 80)... 10

Large-Scale Coal Refining Program Progresses
(BWK: BRENNSTOFF-WAERME-KRAFT, Mar 80)............. 25

FRANCE

Five-Year Plan for Government Aid to Electronics Industry
(J.-M. Quatrepoint; LE MONDE, 15 Apr 80)............ 30

Priorities of Solar Energy Commission Reviewed
(INDUSTRIES & TECHNIQUES, 10 Apr 80)................. 35

Solar Energy Commission Objectives Specified
(SEMAINE DE L'ENERGIE, 21 Apr 80).................... 38

France-Indonesia Scientific, Technical Cooperation
(J. B. Habibie; AFP SCIENCES, 3 Apr 80).............. 39

France-Mexico Scientific, Technical Cooperation
(AFP SCIENCES, 10 Apr 80)............................. 41

Prospects for Geothermal Development Discussed
(SEMAINE DE L'ENERGIE, 7 Apr 80)...................... 42

First Report on Activities of Reorganized CNRS
(LE MONDE, 18 Apr 80)................................. 43

Robot Used for Three-Dimensional Cutting of Body Panels
(INDUSTRIES & TECHNIQUES, 30 Apr 80).................. 45

ITALY

Aeritalia To Produce 30-50-Seat Multipurpose 'Commuter'
(Vito Tullio; AVIAZIONE, Mar 80)..................... 46

FIAT-ENEL Accord on Use of Wind Energy
(IL FIORINO, 12 Apr 80)............................... 50

NORWAY

Research Council Outlines Future Objectives
(AFTENPOSTEN, 14 May 80).............................. 51

SWEDEN

New Gas Turbine Uses Ceramic Parts
(NY TEKNIK, 24 Apr 80)................................ 53

New Turbine Design, by Peter Palmkvist
Ceramics Process, by Erik Mellgren

Companies Discuss CAD/CAM Experiences
(Hans Werner; NY TEKNIK, 17 Apr 80).................. 60

Sailing Ships May Make a Comeback
(Harald Nerman; NY TEKNIK, 3 Apr 80)................. 64

EEC APPROVES FUNDS FOR PROMOTION OF SOLAR ENERGY

Paris AFP SCIENCES in French 17 Apr 80 p 28

[Text] Brussels--EEC: Credits for Promotion of Solar Energy.

The European Commission has just approved a grant of 3 million ecus ($4 million) to support ten projects for promotion of solar energy in the EEC, according to a communique issued on 14 April in Brussels.

The projects in question are in Italy, Belgium, the UK, France and the FRG. They concern systems of harnessing solar energy for dwellings, agricultural enterprises, swimming pools, a school and an electric car.

Since June 1978 the commission has been able to grant financial support to projects in the solar energy area to demonstrate their viability on an industrial level. This financial support can be raised to 40 percent of the project's total cost. The first series of projects (16 in all) was selected in December 1978.

5586
CSO: 3102

EEC ALLOCATES OVER 5 BILLION FRANCS FOR RESEARCH IN 1980-83

Paris AFP SCIENCES in French 20 Mar 80 pp 1-4

[Text] Brussels has announced that more than 5 billion francs are being allotted to research. On 13 March the EEC adopted a multiannual research program amounting to 850 MUCE, equivalent to 5.015 MF. This program is EEC's most important and ambitious research effort since its foundation.

Of this total, about 510 MUCE (3.009 MF), will fund a new 4-year program of the EEC research center, and 340 MUCE (2.006 MF) will be EEC's share of a program for fusion (1979-1983) whose total amount will be 800 MUCE, or 4.720 MF.

Adoption of this program was expected in June 1979, but it can now be said, according to CCR's Director General Roland G. Mas, "that the community's research activities are taking off with new vigor."

As the following tables show, about two-thirds of the program is devoted to problems of energy. Energy research has increased by more than 50 percent. In particular, it includes JET (Joint European Torus), one of the largest TOKAMAK in construction at Culham in Great Britain, and the project SUPERSARA (research into fuel handling in case coolant is lost) which will be done at the nuclear research center at Ispra.

This is the reason for French reserve concerning SUPERSARA (which will get here much later than the experimental reactor PHEBUS at Cadarache) whose research program had only been adopted by the research ministries of the nine last December.

Table 1. CCR Program Structure

	1980-83	1977-80
Nuclear safety and the fuel cycle	49	44
Alternate energy sources	15	15
Study and protection of the environment	10	10
Measures, standards, technical references	9	16
Specific support for the Commission's section activity	7	4
Exploitation of large-scale installations	10	11
	100 %	100 %

One accounting unit UC = 5.9 FF

1 MUCE = 1 million UC

Table 2. Distribution of Personnel and Credits

PROGRAM	Budgeted Expenses (In MUCE)	Total Personnel	Research Staff
A-Nuclear safety and the fuel cycle			
1-Reactor safety	151.30	716	308
2-Plutonium fuel and actinides research	56.35	207	117
3-Safety of nuclear materials	20.85	115	52
4-Management of fissionable materials	20.50	112	55
Totals	249.00	1,150	532
B-Alternate Energy Sources			
1-Solar energy	22.90	117	60
2-Hydrogen production, stocking and transport of energy	14.10	79	40
3-Technology of thermonuclear fission	26.10	124	60
4-High temperature materials	14.90	63	38
Totals	78.	383	198
C-Study and protection of environment			
1-Protection of the environment	33.90	174	90
2-Satellite teledetection	18.35	97	50
Totals	52.25	271	140
D-Nuclear measurement standards	43.20	184	108
E-Specific support for the Commission's section activity			
1-Computer operations	13.83	69	34
2-Safety measures	5.90	25	13
3-BCR support	2.62	13	7
4-Training	3.31	17	9
5-Valorisation	1.74	8	1
6-Scientific and technical fees	8.80	52	27
Totals	36.20	184	91
F-Large scale installations			
1-Exploitation of HRF reactor	52.22	88	41
General Totals	510.87	2,260	1,110

Table 3. Comparison of 1977-1980 and 1980-1983 Programs

	1977-1980 Program (1977 prices in rounded MUCE figures)		1980-1983 Program (1980 prices in rounded MUCE figures)	
	Allocated Credits	Research Staff for Program	Allocated Credits	Research Staff for Program
Nuclear Safety	154	427	249	532
Reactor	77	207	151	308
Plutonium fuel and actinides research	39	117	56	117
Safety of nuclear materials	21	62	21	55
Control and management of fissionable materials	17	40	21	55
Alternate Energy Sources	50	148	78	198
Solar energy	15	33	23	60
Hydrogen	15	50	14	40
Technology of thermonuclear fusion	12	30	26	60
High temperature materials	8	35	15	38
Study and Protection of the Environment	35	109	52	140
Protection of environment			34	90
Aerospace teledetection	35	109	18	50
Nuclear Weights and Measures Technical References	54	170	44	108
Support and Service Activities	16	65	36	91
Exploitation of HFR Reactor	37	41	52	41
Totals	346	959	511	1,110

8860
CSO: 3102

INTERNATIONAL ACCORD TO STUDY FLUIDIZED-BED COMBUSTION

Paris INDUSTRIES & TECHNIQUES in French 10 Mar 80 p 10

[Text] According to an agreement signed 21 February, nine countries, members of AIE,* will pool their knowledge and technology in a 5-year program to study the possible applications of fluidized-bed techniques at atmospheric pressure and its technical and economic aspects.

In the fluidized-bed combustion process, the combustible is burned in a bed of inert particles, air being introduced from the base. The air speed is sufficient to support the weight of the particles, and the layer is agitated in a movement similar to boiling liquid. It is generally considered that this method of burning coal offers encouraging prospects for improving energy savings since it can be adapted to a wide variety of coal types, it is flexible in exploitation methods, and it produces less pollutants. For the short and middle term, applications of fluidized-bed combustion will cover production of electricity, heat for industrial uses, and city heating.

---

*AIE: International Energy Agency. The 9 countries are Canada, Denmark, Italy, Japan, Norway, New Zealand, Netherlands, Sweden and Switzerland.

8860
CSO: 3102

SIX EUROPEAN AUTO MAKERS JOIN IN RESEARCH

Paris AFP SCIENCES in French 24 Apr 80 p 5

[Text] Paris--Signing of a fundamental research agreement between six European automobile manufacturers.

Six European manufacturers are going to combine their efforts in the area of research, "with a view to maintaining the technological advance of the European automobile in the face of American and Japanese manufacturers." Such cooperation has been sought for some time by M Giovanni Agnelli, the Fiat owner, who has persistently denounced the rise in Japanese and American competition.

A long-term agreement has been signed by British Leyland, Ltd, Fiat SPA, PSA Peugeot-Citroen, the National Administration of the Renault Factories, Volkswagen AG and Volvo AB, with the aim of carrying out jointly fundamental research on the automobile, according to a joint communique issued on 21 April by PSA Peugeot-Citroen and Renault.

The agreement has been transmitted to the EEC Commission.

The joint work will be carried out in part /in the companies' laboratories and in part in specialized outside laboratories, including those of universities of international standing/ [underlined]. It will not require the creation of permanent new structures or laboratories.

The research programs will be controlled by the "Joint Research Committee" (JRC) [in English]. Groups of specialists are now working toward defining concrete programs in high-priority scientific disciplines, where joint research projects could lead more efficiently to progress which would benefit each of the members.

Among the possible areas of research these can be mentioned: physics, chemistry and mathematical modeling applied to combustion, to heat transfer, to aerodynamics, to the behavior of new materials, to the study of surfaces, to quality control, etc....

Product development is explicitly excluded from the agreement.

The manufacturers concerned hope nevertheless that the progress in obtaining fundamental knowledge of physical and chemical phenomena bearing on operability of motor cars (energy savings, reliability, safety and environmental protection) will be of service in improving their products.

5586
CSO: 3102

FEDERAL REPUBLIC OF GERMANY

LARGE INCREASE IN FUNDS FOR R & D NOTED

Paris AFP SCIENCES in French 17 Apr 80 p 9

[Text] Bonn--The FRG spent 70 billion francs for research and development in 1979.

More than 70 billion francs (DM 21 billion) were spent last year in the FRG for research and development, 22 percent of which came from the private sector. Since the mid-1960's, expenditures for research and development have increased considerably. They increased fourfold in monetary value between 1965 and 1977.

The major research and development expenditures are in the chemical, electrical and electronic sectors, but the rates of increase are higher in the engineering area, in the automobile and aerospace industry.

Rigorous internal and external competition and acceleration in technological discoveries are the cause of this increase. The seven sectors where growth was fastest between 1970 and 1976 are those which allocated the largest investments to research and development.

They can be divided as follows (in proportion to the increase in sales); chemical sector with 4.7 percent for R & D, automobile industry with 5.7 percent, mechanics and optics with 4.9 percent, engineering with 3 percent, and electrical and electronic industries with 6.4 percent. (See the chart.)

Finally, one German research worker in four works in the chemical industry.

[Chart on following page]

R & D Expenditures by Sector

(in billions of francs)

Industries	Years 1965	 1969	 1973	 1977
Energy, mining	0.28	0.30	0.52	1.65
Chemical	2.9	4.73	6.73	10.35
Engineering	0.83	1.27	3.22	4.10
Automobile, truck, bus	1.04	2.62	3.38	4.70
Aerospace	0.48	1.34	2.73	2.85
Electric, electronic	2.64	4.40	6.82	10.34
Other	2.08	2.46	3.89	5.68
Total	10.27	17.15	27.28	39.97
Industry's share of consumer goods	9.76	16.42	26	37.23

5586
CSO: 3102

RENEWABLE ENERGY SOURCES SURVEYED

Duesseldorf BKW: BRENNSTOFF-WAERME-KRAFT in German Apr 80 pp 140-146

/Article by M. Meliss, Juelich/

/Text/ This year's retrospect concerning the development of renewable energy technologies will retain the organization that has already been used in previous reports (1).

1. Significance of Renewable Energy Sources for the Federal Republic of Germany

Even leaving out of account all economic and ecological restrictions on the use of renewable energy sources within the Federal Republic of Germany, the maximum primary energy quantities that can be substituted are those specified in Figure 1, Part a) (2). These quantities are specified, for the individual renewable energy technologies, in the left part of the circles, in 10^6·t SKE/a (anthracite units/year). The right part of the circles contains the fractional substitution relative to the total annual primary energy demand, which is given in the header line of the figure. This line makes it clear that a further rise of primary energy demand must be expected even in the future. Whether the figures (3) cited here can actually be implemented appears rather questionable at this time. However, this does not change the statement that, today and in the foreseeable future, none of the available technologies represents an "alternative" in the strict sense of the word for presently utilized primary energy media.

This statement is appropriate even in its totality, especially since the annual primary energy quantities cannot be simply added. The reason for this is that the same energy source is used for various supply purposes: Geothermal current, for example, can be used either to generate electricity b or to produce heat f. Direct solar radiation energy can be used either to operate solar cells d or for low-temperature collector systems c.

If one analyzes the actual possibilities for introducing these technologies, according to the criteria of economy and availability (4), the substitution potential that can be realized under the most favorable circumstances is

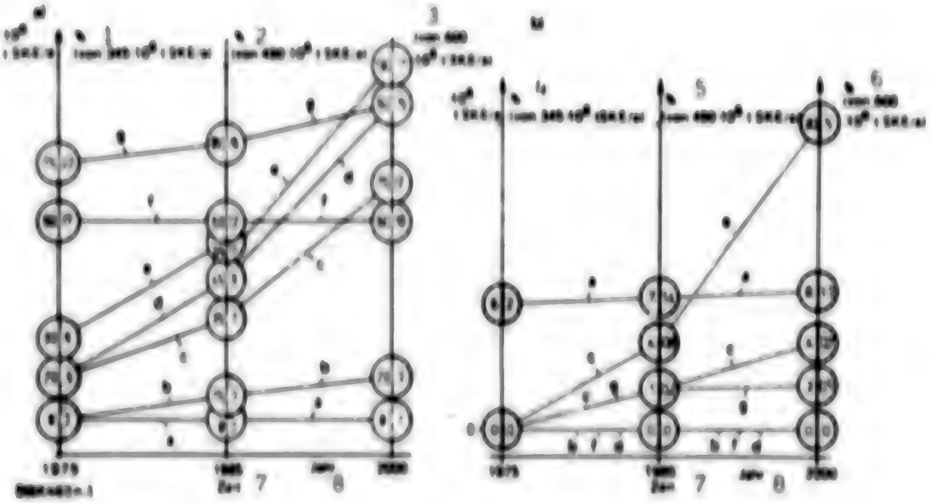


Figure 1: Primary Energy Substitution Potential of Renewable Energy Sources in the FRG by the Year 2000 (2). The Technically Achievable Maximum (Figure a) and Achievable Under Favorable Conditions (Figure b)

Figure a)

- a Hydropower plant, electrical power generation
- b Geothermal power plants, electrical power generation
- c Low-temperature collector systems, decentralized use outside high density areas, η = 20 to 25 percent, utility water heating and domestic heating
- d Solar cell systems, decentralized use, η = 9 to 13.5 percent, generation of electrical power
- e Heat pump systems with the same use as c, utility water heating and domestic heating
- f Geothermal heating plants, generation of heat
- g WEK systems, centralized use, η = 32 to 38 percent, electrical power generation

Figure b)

- a Hydropower plant, electrical power generation
- b Geothermal power plants, electrical power generation
- c Low-temperature collector systems, heating of utility water and domestic heating
- d Solar cell systems, electric power generation
- e Heat pump systems, utility water heating and domestic heating
- f Geothermal heating plants, generation of heat
- g WEK systems, electric power generation

Key:

1. From $345 \cdot 10^6$ t SKE/a
2. From $490 \cdot 10^6$ t SKE/a
3. From $600 \cdot 10^6$ t SKE/a
4. From $345 \cdot 10^6$ t SKE/a
5. From $490 \cdot 10^6$ t SKE/a
6. From $600 \cdot 10^6$ t SKE/a
7. Time
8. Year

drastically reduced, Part b) Figure 1. At any rate, by the year 2000, about $45 \cdot 10^6$ t SKE/a could be furnished, which would correspond to 7.5 percent of the primary energy media that will then be required (5). Relative to renewable energy sources (predominantly hydropower plants) that are already in use today, this implies a sevenfold increase of the energy contribution; to achieve this increase, considerable research and development efforts will still be required. The federal government has logically further increased the means for non-nuclear energy research, as Table 1 shows (6). By 1982, these fund are to be increased to $928 \cdot 10^6$ DM per year (7). However, it should be noted that, for example in 1980, not even one-fifth of this is used for developing renewable energy sources. Although the Federal Government of Germany belongs among the most research-intensive industrial countries in the western world (OECD countries), it occupies one of the last places with respect to researching renewable energy sources (8).

Table 1: R & D Federal Funds for Energy Research in 10^6 DM

	1972	1974	1976	1978	1980
Nuclear Energy Research	789	924	1004	1012	1260
Non-nuclear Energy Research	10	110	233	476	616
Fusion Research	57	76	85	75	95
Relation of Non-nuclear to Nuclear Amounts	1:78.9	1:8.4	1:4.3	1:2.1	1:2.0

The predominant part of public funds flows into projects which are executed by the project management of energy research (9). By the end of 1978, about 1560 projects were promoted in the following areas, paying out a total of $441 \cdot 10^6$ DM in allocations:

1) Efficient energy use in the application and secondary energy area ($73 \cdot 10^6$ DM),

2) Coal and other primary fossil energy media ($319 \cdot 10^6$ DM)

3) New energy sources ($49 \cdot 10^6$ DM).

Research projects concerned with renewable energy technologies are situated both in the first working area (e.g. heat pumps, energy storage) and in the third working area (e.g. direct and indirect utilization of solar energy, geothermal energy). Now as before, the predominant portion falls to solar research. A clear mutual delimitation of technologies is not unambiguous here. This is apparent through the example of so-called passive systems (10) for utilizing solar energy in residential construction. These systems extend from pure heat insulating measures (efficient energy use) through architectural measures (e.g. optimizing the size and direction of windows) to quasi-active techniques such as Trombe walls (thermal utilization of solar radiation).

In the Federal Republic of Germany, research projects in the area of passive utilization of solar energy are still quite sparse, although adequate research funds are available for this. The idea is gradually gaining ground that the utilization of solar energy, in our country, and especially in the area of residential construction, requires optimizing the overall energy utilization system, and not merely individual components of this system (heating, hot water supply, reduction of energy demand, etc.).

In the future, developments in this area will be reported, if appropriate, in another annual survey.

2. Passive Systems, Low-Temperature Collection Systems, and Heat Pumps

Among the large number of possible passive systems for utilizing radiative solar energy, four representative types will be presented (11):

1. "Clearview": A system in which the window areas and the heat storage masses are enlarged, so that entire portions of the building are, so to speak, designed as low-temperature (NT) collector systems.

2. "Freeflow": An NT-collector that works according to the thermosiphon principle. It is integrated into the wall and uses air as the heating medium.

3. "Sunrise": A Trombe-wall, which not only has the characteristics of the Freeflow system, but also transfers heat by conduction in the building wall.

4. "Skyview": A system, in which the roof construction is converted for solar storage, for example by using water containers. When using movable heat insulation coverings, this system can also be used for cooling in the summer.

These systems were analyzed at eight locations in the USA, as regards their energy savings and as regards their increased cost, as compared to conventional construction. It appeared that the Freeflow construction comes out best with a rough cost-use calculation, followed by the Trombe system, the Clearview system, and the Skyview roof storage. All systems furthermore are more dependent on their erection site than presently customary active systems, so that careful optimization is necessary for each application. However, as a rule they are more economical and simpler in construction. Especially when coupled with increased heat insulation of the remaining building body, their use can drastically reduce the heating demand. They should be used in every case before installing active technology.

Philips Research Laboratory, in its final report on efficient energy use and on the use of solar energy in buildings (12 to 14) comes to the same conclusion. The results of researches performed between 1974 and 1978 are reported here. Besides experimental work (among other work, operation of the Aachen Experimental House), these researches also included system-analytical calculations. This project was one of the largest solar research projects, being funded with about $13 \cdot 10^6$ DM. The Federal Ministry for Research and Technology contributed about half of this amount.

The research results can be summarized as follows:

1. The heat demand in buildings can be reduced far more than has previously been assumed, by energy-saving measures and by using alternative energy sources.

2. Measures should be taken in the following sequence:

    - Increased heat insulation
    - Controlled ventilation with heat recovery
    - Heat pumps or NT collector systems.

3. More attention should be paid to research on energy-saving construction designs.

An important further result of the Philips research is the renewed indication that, in our latitudes, solar heating systems based on conventional flat collectors can cover only a small portion of the overall energy demand. Because of this fact, research and development in the heating sector is at this time being increased in three directions:

1. Improvement of conventional heating technologies
2. Development of highly efficient collector systems
3. Development of NT-collector/heat pump systems.

The present market situation shows the same trend (15 to 18). At this time, about 5,000 solar systems are being operated in the Federal Republic of Germany. Among these, by far the predominant portion (about 75 percent) are pure utility water preparation systems based on one- or two-pane flat collectors. These collectors are used for room heating only in individual cases. Pure heat pump systems are used much more frequently for this purpose. A combination of simple collector/heat pump systems are promising in the future. The RWE (Rhenish-Westphalian Electrical Works) already early on called such systems an "energy roof" (19). Their basic difference with respect to traditional NT-collector systems consists in the requirement of making available not only pure radiative energy but also ambient heat (convection, condensation heat, ice-formation heat). This is done by direct or indirect coupling of the collectors with a heat pump. By using transparent roof shingles and by using an absorber as a substrate, the entire roof surface becomes an air collector, which is used through an air-air or an air-water heat pump, set up in the roof space. The heat furnished by the collector can also be directly conducted to a heat exchanger, which transfers it to the evaporator of the heat pump. So that the heat pump will not operate too intermittently, the heat exchanger can be designed as a so-called cold storage. The requirements for the front and back side insulation of the collector can be minimized with the collector/heat pump systems, because the collector works practically at ambient temperature. This goes so far that a front-side covering can be completely dispensed with, and the rear insulation is only used to prevent heat flow from the roof space to the absorber. In contrast to the collector roof, this mode of construction could be logically called an absorber roof. Both combination systems, however, are in principle not limited to roof applications. For example, at this time an absorber/heat pump system is being offered under the name "Energy Fan," in which the absorber surfaces are arranged vertically and can be set up as a compact heat exchanger, for example, in a garden (21).

At the present time, a number of different combination systems are in the trial stage. Steel, aluminum, copper, and plastics are used as absorber materials (22 to 25). None of these systems can as yet be regarded as technically mature, especially since uniform evaluation criteria for their performance do not yet exist. This also applies to the NT-collector systems themselves. The Federal Association on Solar Energy (BSE) has therefore tried, at the occasion of the 1979 Hannover Fair, to characterize NT-collectors with uniform "solar collector product information" (26). However, this effort has not yet entered into the DIN directive on the performance behavior of solar systems (DIN 4757), which is currently being written. Consequently, now as before, the buyer lacks binding comparative criteria. In order to clarify the market situation, despite this lack, the BMFT (Federal Ministry for Research and Technology) has recently commissioned the Product Testing Foundation to perform utility studies on systems which use solar energy and to perform comparative product tests (27).

The estimates of potential that were listed in the first section make it clear that heat pumping systems offer the largest and quickest energy-saving opportunities. The heat pump market reflects this: In the previous year, about 700 to 1,000 systems were sold, so that the number of heat pump systems operating in the Federal Republic of Germany has now increased to about 7,000. For 1980, one expects up to 20,000 heat pump orders (28 to 30). By far the predominant portion are electrically driven heat pumps in bivalent operation (i.e. the heat pump shuts off when the outside temperature reaches a certain level, as prescribed by the electric utilities; at that point, a non-electrical heat source takes over the heating process). However, whether this type of heat pump application "belongs to the future" - as reference (29) emphasizes - must be doubted, since electrically driven heat pumps do indeed save primary energy in comparison to oil heating systems, but do not do this to the maximum extent possible. However, both heat pump systems are in the developmental stage. No significant advances are expected during the next years, especially in the power area below 50 kW (single- and two-family houses). However, individual systems of this type are already being offered and marketed.

3. High-Temperature Collector Systems and Solar Cells

Although solar systems, which generate electricity on the basis of circulatory processes, will not be used in the Federal Republic of Germany (34), intense R & D work is partly being performed here. Table 3 gives a survey of these activities (35). Experience with the flat collector systems has advanced the furthest. On the basis of the low available temperatures and the associated low power plant processes, these systems attain only efficiencies of a few percent. This can be accepted only when investment costs are also correspondingly low. However, this is not the case, so that the utilization of such systems will certainly be limited to decidedly exceptional cases (36).

Table 3: Solar Installations Which Generate Electricity, With German Participation

Power	Manufacturer*	Location	Type of System
10 kW	MBB	India	Flat Collector
10 kW	Dornier	Egypt	Flat + Trough
10 kW	AEG	Greece	Flat Collector
40 kW	MAN	Spain	Trough
100 kW	MBB	Kuwait	Paraboloid
100 kW	Dornier	Mexico	Parabolic Trough
500 kW	MAN	Spain	Trough
1 MW	MBB	Italy	Tower Design
500 kW	Interatom	Spain	Solar Tower
20 MW	Interatom**	?	Tower Design

* With Working Associations: Management of the German Contribution

** Planning Phase

Solar farm installations with concentrated collectors and solar tower installations offer better chances, since here the overall efficiency will at least raised to about 20 percent. Combined with utilization which optimizes performance (low specific investment costs), electrical

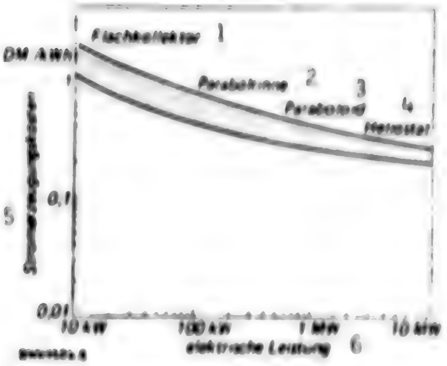


Figure 6: Expected Costs for Generating Electrical Power From Solar Power Plants (Without Transport Costs)

For Comparison: Currently Operating Large-Scale Power Plants 1980:
LWR or brown coal = 0.06 DM/kWh
Natural gas = 0.09 DM/kWh
Oil or anthracite = 0.10 DM/kWh

Key:
1. Flat Collector
2. Parabolic Trough
3. Paraboloid
4. Heliostat
5. Costs for Generating Electrical Power
6. Electrical Power

power generating costs could thereby be actualized, such as are shown in Figure 6. However, these figures do not yet contain costs for the possible storage of energy and for its transport to the consumer, which can be quite serious under some circumstances. For example, for a solar tower system which generates electricity in the Sahara for a European consumer, the energy transport costs (hydrogen or high voltage DC transmission) are again as high as the costs for the energy conversion itself.

Whether the expected costs can be realized in practice still remains to be seen, since the prototype installations are still in the building or in the planning stage: For example, for the comparison project Farm/Tower in Almeria, Spain, the foundation stone was only laid on 17 January 1980. Sufficient operating experience for predicting costs more accurately will only be available at the earliest by 1985 (37).

The largest project being developed at this time is the 20 MW tower installation, which is supposed to use a gas turbine process to generate power. Table 4 shows the most important characteristic quantities of GAST (Gas-cooled Solar Tower Power Plant). Its first design phase is supposed to be completed in the spring of 1980. The entire running time of the project, which also includes the construction of a prototype installation, will be 6 to 7 years (38). The planning phase is in progress at this time, and it is being implemented by a consortium of corporations, under the management of Interatom, Bensberg (39).

Table 4: Main Characterists of GAST (Gas-cooled Solar Tower Power Plant)

Electrical Power (Net)	20 MW
Heat Source	Sun With Fossil Back-up System
Absorber Arrangement	Central, Tower Concept
Absorber Type	Modular Cavity Absorber
Energy Conversion	Gas Turbine/Generator
Height of Tower	200 m
Mirror Surface of the Heliostat Field	120,000 m^2
Total Surface Requirement	500,000 m^2

Research and development within the Federal Republic of Germany was intensified in the area of electrical power generation using solar cells. At the present time, it cannot yet be foreseen which semiconductor material and which type of diode will establish itself for terrestrial application. Probably, various solar cells will prove optimal for various applications (40).

The center of interest of R & D efforts, now as before, is concerned with reducing production costs of these cells by several orders of magnitude (41), so as to open up more application possibilities for this method of energy conversion. The higher production rates that can be achieved thereby can lead to further reductions of production costs. The main target here is the silicon cell. AEG Telefunken predicts a price of 5 DM/W (peak power) for this cell by 1985 (about one-tenth of the current price). There is also hope for thin-layer cells. In this area, hydrogen-containing amorphous silicon cells already have achieved promising efficiencies up to 5.5 percent. In Japan, cells of this type are already being produced commercially. But their efficiency is still only about 2 percent (42).

4. Wind Energy Converters

The main interest in using wind energy at this time lies in large-scale electrical power generation. The electric utility enterprises HEW, RWE, and SCHLESWAG have founded a construction and operating company (43) to construct the large prototype GROWIAN I. This system is supposed to be erected at Kaiser-Wilhelm-Koog at Brunsbüttel, and it is supposed to have the characteristics given in Table 5. The construction costs will be 30 million DM, and about the same sum is allocated for possible changes and a comprehensive accompanying program of measurements (44). Model calculations Regensburg University (45) have accompanied the production of the building documentation for Growian. These model calculations indicate that wind energy can cover at most about 14 percent of the electrical power demand in our country. For this purpose, however, about 4,000 systems of the GROWIAN type would have to be erected in coastal areas that are most favorable as regards wind conditions, or in similar good utilization sites. This will be feasible with certainty only if Growian fulfills its expectations. After successful trial operation, other prototypes will be built in the middle of the eighties. About 100 installations will then be combined to form a power plant network. Furthermore, GROWIAN II will be erected, and it will have only a single pair of vanes with 5 MW design power.

Table 5: Characteristic Data of Growian I

Installed electrical power		3	MW
Generator speed		1,500	min^{-1}± 15%
Average annual energy yield		12	GWh
Specific surface power		380	W/m^2
Nominal wind speed		11.8	m/s*
Start-up wind speed		6.3	m/s*
Maximum operational wind speed		24	m/s*
Nominal rotor speed		18.5	min^{-1}± 15%
Rotor diameter		100.4	m
Height of the hub above ground		100	m
Dimension of the machine house with rotor		240	t
Operating area	about	800	m^2

* Measured at the height of the hub.

5. Possibilities for Using Other Energy Sources

In the hot but dry bedrock of the Federal Republic of Germany, the single-borehole process, to which reference was made in (1), can be used to obtain geothermal energy. This was demonstrated in Urach/Baden-Württemberg. Mining the rock layer at a depth of 3300 m (about 145 degrees C) created a heat-exchange surface of about 3000 to 5000 m^2. The surface water was introduced in an inner pipe and could thereby be heated from 11 degrees C to 20 degrees C.

Further research is directed towards generating still larger heat-exchange surfaces, since economical utilization of this method, for generating hot water and water for consumption, is only expected with surfaces extending at least 1 km^2.

The application possibilities of the two-borehole process were also investigated further: The working community Intertherm (Salt Grade Subsidiary Deutsche Schachtbau and Tiefbohr Company mbH and Braun and Sorensen) was commissioned with the drilling operations for a geothermal heat power plant in Bühl/Baden. The project is predominantly financed by BMFT funds. It is supposed to convey 125 to 150 m^3 hot water (90 to 120 degrees C) per hour, and is supposed to conduct this water to a remote heating plant. Three gas-fired heating boilers are here available for peak supply. Furthermore, a heat pump allows recuding the temperature of the reinjected depth water to about 35 degrees C, which considerably increases the efficiency of the geothermal portion of the power plant.

The BMFT is also financing a study of the utilization of wave energy (46). This study concludes that the most promising transducers in the power range below 100 kW are inertially stabilized semi-submerged buoys.

Besides generating electrical power, such transducers could be used, for example, to process drinking water or utility water (reverse osmosis systems).

In the USA, projects were implemented to use the heat of the sea (OTEC = Ocean Thermal Energy Conversion). These projects are being carefully observed by the Federal Republic of Germany. Whether the Federal Republic should pursue its own development or increase its participation in American developments could be clarified by an appropriate feasibility study (48).

Bioconversion also received increased attention in the year just passed. The earth annually generates about 10^{11} tons of plant material. At this time, only 1 to 2 percent of this is used to produce foods and feeds, 1 percent to obtain papers and fibers, and about 1 percent as wood for fuel (49). Biological-technical processes for obtaining energy consequently still have a large use potential worldwide (50). In the Federal Republic of Germany, the conversion of biomass for pure energy purposes does not seem to make much sense, because the available planting areas are so limited. This method should here be primarily used for waste treatment (51).

BIBLIOGRAPHY

(1) Meliss, M.: Renewable Eneral Sources (Annual Report), BWK 29, No. 4, pp 136/42, 1977; BWK 30, No. 4, pp 151/56, 1978; BWK 31, No. 4, pp 147/54, 1979.

(2) Meliss, M., Stein, H.J.: The Significance of Solar Energy for the Future Energy Supply of the Federal Republic of Germany. Annual Report 1977/78 of the Nuclear Research Plant JÜlich GmbH, JÜlich, pp 47/57

(3) Same data also in Frank, E. and Waldmann, H.: Time Problem, Energy Supply, Energy Sources, Alternatives, VDI-GET Lecture Series on the World Energy Saving Congress, DÜsseldorf, 1979

(4) Meliss, M.: Influence of Low Temperature Solar Heat Application on the Energy Demand of the Federal Republic of Germany, Proceedings of the Australian-German Workshop on Solar Energy System Design, VDI-GET DÜsseldorf 1979.

(5) Kollmann, H.: Analysis of Current Energy Demand Forecasts: Possible Contribution of Renewable Energy Sources. In preparation. Contains references to other authors, who specify the same order of magnitude for substitution. For example: (5 - 10 percent) SPD: Energy Policy, First Interim Report of the Commission on Energy Policy With the Party Leadership of the SPD, Bonn, Sept 1979 (2 percent) Mobil Oil AG: Survival Question Energy, Hamburg 1979.

(6) BMFT: Safe Energy for an Environment Worth Living In, Bonn 1979.

(7) VDI/VDE: Billions for Energy Research. twv - Technical-Scientific Associations of Aachen, No 7/8, p 3, 1979.

(8) Too Little Public Funding for Energy Research? A Survey on the State of Energy Research in the Western Industrial Countries. An FAZ View Through the Economy. 6 December 1979.

(9) PLE/BMFT: Annual Report 1978 Concerning Efficient Energy Utilization, Primary Fossil Energy Media, New Energy Sources, JÜlich/Bonn 1979.

(10) Austrian Society for Solar Energy and Space Questions: Active and Passive Systems for Using Solar Energy in Residences - Recommendations and References -. ASSA - Information Service 5/1978, Vienna, May 1978.

(11) Kohler, J. and Putnam, B.: Passive Cost and Performance Comparisons. In American Section of the Internation Solar Energy Society: Passive Systems '78, University of Delaware, Newark, pp 212/18, 1979.

(12) Bergmann, G. et al.: Efficient Energy Utilization and Utilization of Solar Energy in Buildings. Philips Research Laboratory Aachen, March 1979, Part I: Long Version Part II: Summary.

(13) Report on the Experience with the Philips Solar House in Aachen. SOLAR + WARME TECHNIK (Solar + Heat Technology) (1979) No 1, p 9, Bielefeld, Nov. 1979.

(14) Weber, R.: The House Which Hardly Needs Heating Anymore, VDI Reports No. 42, 19 October 1979, p 34.

(15) PESA Stucy: Practical Experience with Solar Systems. Study under contract with the BMFT, at this time in press. Promotor Publisher Karlsruhe. Quoted after: CCI, 18 January 1980.

(16) Society for Market Research mbH: Questionnaire Concerning Knowledge of and Attitudes to Solar Systems Among the Owners of Single- and Two-Family Houses. In (17) Part 2, p 105/20.

(17) KFA/GFHK: Sample Solar Houses: Investigation of the Scientific Objectives and Feasibility of an R & D Project, Study Under Contract With the BMFT, Interim Report, Jülich/Bonn 1979.

(18) Test: Market Survey on Solar Systems: Is the Sun an Alternative? Information Document of the Ministry for Economy, Small Business, and Traffic, Baden-Würtemberg, in collaboration with the Product Testing Foundation, January 1979.

(19) Stoy, B.: The Sun - Desirable Energy, Heidelberg, Energy Publishers, 1977.

(20) Stoy, B: Solar Energy, Geothermal Energy, Mass Attraction. Lecture before the Reactor Congress, Düsseldoft, April 1976.

(21) Bücher, G.: Energy Fans as a New Solution for Gathering Solar Energy. SWT - SOLAR UND WÄRMETECHNIK (Solar and Heat Engineering) I (1979) Nov. p 36/37.

(22) Ritter, A.: Solar-Supported Heat Pump Heating with Plastic Solar Collectors. DGS Congress on Solar Heating 4: Design, Installation, and Practical Application of Solar Systems, Frankfurt/M. 29-31 March 1979, pp 1/21.

(23) Stoy, B.: The Energy Roof. Energy Publisher, Heidelberg, 1978.

(24) Hinterneder, H.: The Solar Roof in the Form of an Air Collector. SWT - SOLAR UND WARMETECHNIK (Solar and Heat Engineering) I (1979) Nov., pp 33/35.

(25) RWE: The Energy Roof - an RWE Development - Reprint for the Hannover Fair, RWE Information Bulletin No. 157, Essen 1979.

(26) BSE: Solar Collector Product Information, Hannover, 18 April 1979.

(27) Hauff grants contracts for test methods for solar systems, VWD, 24 January 1980

(28) Engel, G.: Heat Pumps Have Long Delivery Times. FAZ - View Through the Economy, 1 December 1979.

(29) The Heat Pump Market is Better Than Expected. VDI Reports, p 19, 16 November 1979.

(30) Wagner, H.J.: Report on the International Technical Meeting on Gas Heat Pump Practice, Timmendorfer Strand, 11-13 September 1979.

(31) After Steimle, F.: Heat Pump Systems and Their Operation. Congress on Gas Heat Pump Practice, Timmendoefer Strand, 11-13 September 1979.

(32) Compare also Battelle Institute: Heat Pumps for Heating, Coolings, and Energy Recovery 1976-1990, Publishers TUV Rheinland, 1979.

(33) Compare also Hoechst-AG: Gas Heat Pump. The Heat Pump Is Really Here, Frigen Information Service, Frankfurt/M, August 1979.

(34) Meliss, M.: Renewable Energy Sources. BWK 29, No 4, pp 151/56, 1977.

(35) Kleemann, M.: Solar Power Plants, Lecture on Non-nuclear and non-fossil Primary Energy Media, Essen University, 24,9-28 Sept 1979.

(36) Künzel, M.: Power Generation by Solar Energy. Karlsruhe, Müller Publishers, 1978.

(37) Mirrors Collect Solar Power. VDI REports 18 January 1980. See also the extensive report in the same issue: "Solar Farm" and "Solar Tower" tested under realistic conditions, p 4.

(38) Heinzelmann, P.F.: The German R & D Program on Solar Thermal Power Generation. Lecture as part of ISPRA Courses, "Solar Thermal Power Generation", Ispra/Italy, 3-7 Sept 1979

(39) Interatom, KWU, MAN, GHH, MBB, Dornier: Gas-Cooled Central Receiver Solar Power Plant, Bergisch Gladbach, 1979.

(40) Selders, M. and Bonnet, D.: Solar Cells. PHYSIK IN UNSERER ZEIT (Physics in Our Time) 10, No 1, pp 3/16, 1979

(41) 1979 Photovoltaic Solar Energy Conference, 23-26 April 1979, Berlin; see also short conference report by Niekisch, E.A.: Progress With Semiconductor Solar Cells, BWK 31 No 7, pp 304/305, 1979.

(42) Amorphous Silicon Solar Cell of Unusual Size Is Produced by Fuji. The Japan Economic Journal, 22 May 1979.

(43) Helm, S. and Körber, F.: Planning a Large Wind Power System for 3 MW Electrical Power. MAN, Munich, 24 November 1979.

(44) Beginning of Construction on GROWIAN in the Summer. VWD, 8 January 1980.

(45) Jarass, L. et al: Large Scale Wind Power Utilization in the Federal Republic of Germany: A System-Analytical Evaluation of its Technical and Economical Potential. Regensburg, August 1979.

(46) Eckener, U. et al: Wave Energy, Technology and Utilization, System Study, Friedrichshafen, March 1979.

(47) Kayer, H.: Energy Supply Through Wave Generators, mt (1974) No 1 February, pp 29/31.

(48) Koske, P.H.: OTEC Ocean Thermal Energy Conversion, Present Status and Future Development of the Project "Energy Recovery From the Heat of the Sea", in the USA, GKSS, Geesthacht, July 1979.

(49) Sahm, H. and Schoberth,S.: Microbial Conversion of Plant Residues. Annual Report 1978/79 of the KFA, Jülich, pp 55/64

(50) Kolbusch, P. and Schäfer, W.: Biological-Technical Systems for Obtaining Energy. Study under contract with the BMFT, Bonn 1979.

(51) Witte, E.A. (Ed.): Biological Waste Treatment of Slurries: Status and Prospects. Discussion of experts on 20 June 1978, instituted by the Project Leader Bioengineering of the KFA, Publisher BMFT, Bonn 1979.

8348
CSO: 3102

LARGE-SCALE COAL REFINING PROGRAM PROGRESSES

Duesseldorf BWK: BRENNSTOFF-WAERME-KRAFT in German Mar 80 pp 79-80

[Text] At the end of January the announced large-scale coal gasification and liquefaction* program was approved by the Federal Government. To implement the program altogether 14 projects were proposed by the industry (see tables) calling, on the basis of prevailing prices, for the capital investment of DM 13×10^9 until 1993.

As a first step the effort for large-scale coal conversion focused on pilot projects from which the enterprises expect to gain basic information on technical layout, choice of site, construction time, efficiency and environmental protection. To that end DM 70×10^6 in state funds were made available for 1980 and 1981. The pilot projects are meant to serve industry as a basis for construction planning and the Federal Government as a guideline for the needed additional outlay of public funds. The results of the pilot plant projects on coal gasification are expected to be available by the end of 1980, for coal liquefaction by the middle of 1981.

At present coal conversion is not yet economical in the FRG. Closest to being competitive is the production of synthetic gas from brown coal. Liquid fuels and synthetic natural gas from German hard coal cost about two to four times as much as crude oil or natural gas. The cost of liquid fuels is still double even when imported coal is used. But by the middle of the eighties, when large-scale production is to begin, the cost relationship is likely to shift in favor of coal.

Federal Minister of Research Hauff and Federal Minister of Economics Count Lambsdorff addressed the problems and objectives of large-scale coal conversion at a Federal press conference: according to the former the environmental costs raise particular concern. The large land areas required and the resulting air pollution could lead to conflicts. Joint efforts were made with industry to reduce pollution levels at the prospective coal conversion sites primarily in the hard coal basins by further expansion of district heating and the natural gas pipeline network and the replacement of obsolete hard coal-fired power plants with modern facilities.

---

*See: Declaration of the Federal Government on energy policy: BWK 31 (1979) No 8, p 309/310.

The minister of economics said that production, employment and continuous investment activity are expected to benefit. The increasing pressure on finding a substitute for crude oil is an indication that the interest in coal conversion will become worldwide and the construction of modern model enterprises is therefore likely to enhance the industry's competitive position and export prospects and thereby also increase employment and production.

Federal Economics Minister Count Lambsdorff stressed further that large-scale coal conversion is part of the energy policy effort to secure for German hard coal a preferential place in the supply of energy. The implementation of all planned project proposals would raise the quantity of hard coal required for conversion to about 12 x 10^6 tons per year and of brown coal to about 10 x 10^6 tons per year till 1993. These quantities will be available according to industry plans if sizable investments are made in the coal mining industry. This applies especially to brown coal, which will become available for coal conversion only if nuclear power replaces it as power production fuel. Over and beyond that imports would largely have to supplement the available hard coal needed for further expansion of coal conversion. The Federal Government expects now that the power and mining industries will increase and extend the agreement on the use of up to now 33 x 10^6 tons per year of hard coal for power production which is a prerequisite for increasing imports of hard coal. The German mines will no longer be able to meet domestic demand in the eighties.

Both ministers warned against the exaggerated expectations that the continuing large-scale coal conversion program might reduce crude oil consumption in the intermediate term; even the successful implementation of all projects by 1993 would eventually substitute only 3 percent of crude oil and gas consumption. Compared to coal conversion the replacement of heavy heating oil with coal in industry and the power industry and the conversion of the thus available heating oil to gasoline and light heating oil is still the faster and more cost-effective approach. Therefore, this potential, estimated to amount to about 20 x 10^6 tons per year, must be fully exploited at the same time.

Table 1. Coal Gasification Projects

Enterprise	Products	Input	Process	Planning Construction Operation	Site
1. Ruhrkohle Ruhrgas	1.5×10^9 m^3/a synthetic gas (sg)	3×10^6 t/a Ger. hard coal	Lurgi high pressure gasification, solid bed gasification	1980/82 1981/84 as of 1984	Ruhr basin
2. Ruhrkohle Ruhrchemie	0.7×10^9 m^3/a sg; of this 50% each Ruhrchemie and Thyssen gas (sg)	0.4×10^6 t/a Ger. hard coal	Texaco process; coal dust gasification	1980/82 1981/84 as of 1984	Oberhausen-Holten Ruhrchemie site
3. Shell	0.6×10^9 cu m sg	0.3×10^6 t/a hard coal	Shell-Koppers gasifier; coal dust gasif.	1980/81 1981/83 as of 83/84	Depends on coal supply
4. Texaco	0.65×10^9 m^3/a sg	0.36×10^6 t/a hard coal	Texaco process; coal gasification	1980/83 1983/85 as of 1985	Rheinpreussen power plant Moers-Meerbeck
5. PVC (Flick Group)	1.1×10^9 m^3/a sg for further processing	0.5×10^6 t/a hard coal	Solid bed gasification	1980/81 1982/84 1985	Hueckelhoven Sophia-Jacoba site
6. Saarberg	0.8×10^9 m^3/a sg for a 60 MW combination power plant	0.4×10^6 t/a Ger. hard coal	Kombiprocess with Saarberg-Otto gasif.	1980/83 1983/84 as of 1985	Saarland

Table 1 (Continued)

Enterprise	Products	Input	Process	Planning Construction Operation	Site
7. Rheinbraun	1×10^9 m^3/a sg	2.25×10^6 t/a crude brown coal	High-temperature Winkler process; fluid bed gasification	1982/85 as of 1982 as of 1984	Berrenrath
8. Rheinbraun	0.7×10^9 m^3/a sg	5.0×10^6 t/a crude brown coal	Hydriarondo coal gasif.	1984/87 1987/90 as of 1990	Rhine brown coal basin
9. Korf	Reducing gas for direct iron ore red.	0.1×10^6 t/a hard coal	Saarberg/Otto gasifier	1980/83 1983/84 as of 1985	Undecided
10. VEW	Coke and gas for 800 MW combination power plant	1.8×10^6 t/a hard coal	Partial atm. pres. gasif. with air	1980/83 1983/85 as of 1985	VEW power plants Gersteinwerk, Lippe and Emsland
11. Thyssengas	0.1×10^9 m^3/a sg	0.35×10^9 m^3/a sg from the RAG-Ruhrchemie project	Fluid-bed conversion to methanol	1980/83 1984/85 as of 1986	Oberhausen-Holten

Table 2. Coal Liquefaction Projects

Enterprise	Products	Input	Process	Planning Construction Operation	Site
1. Ruhrkohle[1]	2 x 10^6 t/a liq. prods., fuel, benzene	6 x 10^6 t/a hard coal	IG-process modified by RAG	1980/83 1983/93 as of 1986	Ruhr basin
VEBA-Oil[1]	2 x 10^6 t/a liq. prods., fuel, light heating oil, chemical feedstock	6 x 10^6 t/a hard coal or heavy oil	Modified IG-process (also heavy oil usable)	1980/83 1984/87 as of 1987	Undecided
2. Saarbergwerke	800,000 t/a hydrogenated gasoline	2 x 10^6 t/a Saarland steam coal	IG-process modified by Saarberg	1980/82 1983/86 as of 1987	Saar basin
3. Rheinbraun	400,000 t/a fuels, feedstock for chemical industry	3.5 x 10^6 t/a crude brown coal	IG-process modified by Rheinbraun	1985/88 1988/91 as of 1992	Rheinland brown coal basin

---

[1] Ruhrkohle and VEBA negotiate a merger of their projects.

8664
CSO: 3102

FIVE-YEAR PLAN FOR GOVERNMENT AID TO ELECTRONICS INDUSTRY

Paris LE MONDE in French 15 Apr 80 pp 21, 23

[Article by J.-M. Quatrepoint: "Is the French Integrated Circuits Industry Capable of Catching Up?"]

> [Text] To assist the development of one of the most promising advanced areas of technology, the authorities launched a 5-year components plan (1978-1982). Three factories will go into production at the beginning of next year. Are the means put to work, notably for research, up to the plan?

With a turnover of 9.2 billion francs in 1979, staffs of 53,500 persons, exports of 5.3 billion francs, trade figures in balance overall, an international exhibition--which has just closed its doors--which enjoys greater success each year, the French electronic components industry should justifiably have reason to be satisfied.

Seeing that the expected explosion of telematics and the invasion by electronics of all areas of activity are going to multiply its sales during the coming years (see more particularly LE MONDE of 1 February 1979), is it not anticipated that the average rate of growth of this industry will be at least 15 percent a year?

However, these raw figures, these beautiful prospects hide disquieting weaknesses. There is Japanese competition in the area of tubes and components for radio and television. For semiconductors, and still more for integrated circuits, there is the technological lag with respect to the United States, with a growing trade deficit as a corollary.

To try to recoup, the French authorities launched--now nearly 3 years ago--the idea of a components plan analogous to the computer plan. Since the beginning of 1979, the definitive terms of the plan have been set up. It provides for the awarding by the government of public credits amounting to 600 million francs for the 5-year period 1978-1982.

Five industrial groups profit from this manna, to which are added various other loans and subsidies (FDES [expansion unknown], Aid for the Creation of Jobs, aid from DATAR [Delegation for Territorial Development and Regional Action]). For two groups there were hardly any problems. Radio-technique-Compelec (a Philips subsidiary) and Thomson each receives 100 million francs--the first to develop bipolar circuits used in computers, the other to develop its potential in classical linear circuits.

The main point of the effort was, however, to bear on MOS (metal oxide semiconductor) integrated circuits. Having many applications, they already cover 50 percent of the world market. It is estimated that their market in Europe will grow from 2.8 billion francs in 1980 to 6 million in 1985. But American firms have a virtual monopoly and a very clear technological lead. This is why the assistance of the authorities was devoted to the establishment of three groups for production of MOS circuits in France with, in each case, the technological support of American companies associated with French manufacturers. Thus, the following companies have come into being: Matra-Harris; Eurotechnique with Saint-Bogain - Pont-a-Mousson (SGPM) (51 percent) and the American National Semi Conductor (49 percent). Finally, Efcis, the former CEA [Atomic Energy Commission?] laboratory, has taken over the means of production of Thomson in his sector of activity (Thomson and the CEA moreover share the capital) and signed licensing and cooperation agreements with Motorola, No 2 worldwide.

Where are these companies now? Have the right selections been made? Does France have a real chance of catching up? All these questions arise while the components plan is halfway along.

Three Production Units

Efcis--The first production line of MOS circuits, installed in the company's old premises at Grenoble, will go into production at the beginning of 1981 and the staff already numbers 460. The turnover was 31 million francs in 1979 and should reach 300 million in 1982. The investment program for the period 1978-1982 is 670 million francs. Its financing is assured at a cost borne one third by the state, one third by the two shareholders, Thomson and CEA, and one third by internal financing and various loans. The investments will be devoted to research and especially to installation of the three production lines planned (the second will also be at Grenoble but the site of the third is not yet set).

Their cost is estimated at more than 400 million francs, 70 percent of which is for the purchase of highly complex machines available only in the United States.

Thus, the amount of orders placed across the Atlantic before Elfcis [as printed] has started large-scale production is up to 300 million francs. To that must be added the various fees and royalties paid to the American Motorola group for technical assistance and use of its licenses.

Eurotechnique--The plant at Rousset near Marseille will go into production in January 1981. The goal is a turnover of 500 million francs in 1985 and "to make a profit starting in 1983." The overall investments over a 5-year period are estimated at 420 million francs, including 340 million francs for various equipment bought to the extent of 80 percent in the United States. National Semi Conductor (NSC) will collect an annual fee calculated in terms of the plant's production and productivity. Finally, the 49 percent investment of NSC in Eurotechnique has been subscribed not as cash but as a "transfer of technology."

The initial financing is thus totally provided by the French partner: 90 million francs of its own funds supplied by SGPM; 100 million francs in state subsidies within the framework of the components plan; participating loans at a reduced interest rate by governmental entities. Eurotechnique's internal financing and the complementary loans should, as we hear, cover the investments for 1983-1984.

Matra-Harris--The first MOS circuit should leave the La Chantrerie plant located 8 kilometers from Nantes on 25 December 1980. A turnover of 25 million francs is expected for 1981 and 200 million francs in 1985. The staff will reach 120 at the end of the year. The amount of the investment is 200 million francs over a 5-year period, including one half for equipment (80 million francs spent in the United States) and 40 million francs for studies to develop a special type of circuits for telecommunications.

The government supplies 120 million francs (20 million in subsidies and 100 million in loans) and Matra expects to invest 80 million francs by 1985. As for the American company Harris, it supplies ... its technology. Valued at 48 million francs, this has been bartered for its 49 percent participation in Matra-Harris.

In 1981 France will thus have three integrated circuits production units and some 800 jobs will have been created. However, in the professional circles at the very heart of the firms concerned, questions are being asked as to how definitive the operation is.

Aren't we blinded by short-term goals--creation of jobs, hopes for exports--while neglecting the long term? In fact, after more than 2 years of being in force the components plan shows serious gaps.

First, and everyone is very conscious of this, too much was expected. Eighteen months elapsed between the announcement of the plan and its being set up. Eighteen months during which the competition worked, technology raced forward, outside circumstances changed.

Second error: The volume of investments is insufficient. Overall, 1.3 billion francs, at least one third supported by the state, are foreseen for the period 1978-1982. "That's a lot," the layman will think. "That's a trifle," say the specialists, who compare this figure to those of American or Japanese firms. "In France they talk about hundreds of millions of francs. Elsewhere, they think in hundreds of millions of dollars." Thus, the American company Intel, Number 3 worldwide in integrated circuits, will invest $300 million in 1980, including 90 million for research. Or as much in one year as Efcis, Eurotechnique and Matra-Harris combined.

It is estimated in the components industry that it is necessary to invest 1 franc to get 1 franc in annual turnover. At Efcis, where they acknolwledge being "already a little short," they think that this relation "may increase. Soon it will be necessary to invest 2 francs for each 1 franc of turnover." That, to be sure, is for those who want to stay in the race .... By spreading governmental assistance and reserving it for industrial operations, basic research is neglected. This is another gap in the plan. Certainly, various laboratories of public organizations, specifically the National Center for Telecommunications Study, have been concentrated at Grenoble and are working, with government credits, on the development of the next generation of circuits (the VLSI). But the facts are there. Japanese and Americans are from this moment 18 months ahead on the VLSI.

An Offensive Industrial Policy

Another consequence of this sprinkling: in increasing the number of industrial groups, one has increased--paradoxically--the outflow of foreign exchange, mainly for plant equipment which must be purchased in the United States. This is supposed to be a total of nearly 600 million francs, which leads some to say that "the integrality of the components plan in fact crosses the Atlantic and that the French taxpayer thus finances American enterprises!" We are discovering today--a little late--that one of the American components industry's keys to success is precisely the close symbiosis between the producer of circuits and the one who manufactures--more or less to order--the equipment which allows circuits to be produced under the best conditions. Matra, which has become aware of the problem, is supposed to be thinking of acquiring an American firm specializing in this equipment.

From the example of the equipment one realizes, little by little, that an offensive industrial policy in the area of components must be an overall policy and not parochially limited to the production of circuits. We must concern ourselves with what is upstream--basic research, mastery of equipment and technologies, of raw materials (silicon, rare earths)--as well as with what is downstream--training of men, repatriation of the "brains" expatriated to the United States; the role of the large users. But it behooves us to state that the components plan is somewhat bandy-legged. Too much is made of it. Or not enough.

Too much, because if it was simply a matter of creating some hundreds of jobs, of improving the trade balance, it was not useful to finance American firms, as has been done. It would have been--on the whole--simpler to let them establish subsidiaries and finance them themselves. The component manufacturers across the Atlantic all have the same goal: to get rooted in Europe in order to capture portions of the markt. The NSC directors are all happy to be able, thanks to the agreement with the French, "to attack," as they say, "the European market from both ends." With their own brand name and under the French flag of Eurotechnique. And this, without untying their pursestrings. Assuredly, NSC, Harris and Motorola have a good thing going for them. The behavior of other American firms, such as Intel, who are trying to become a part of the French plan, should be enough to convince one of this.

The argument that the joint ventures of the components plan allow an actual transfer of technology leaves more than one observer skeptical--and makes them smile across the Atlantic. In the minds of the Americans, there will always exist a technological lag between the United States and Europe. The innovation must first be sold on their market before traversing the Atlantic. Even if the "gap" is reduced, it will always remain .... the Franco-American factories being considered as "second sources" or decentralized manufacturing units.

On the other hand, if the goal of the authorities is indeed for the French components industry to become emancipated from its dependence on the United States after a certain time, to master the most advanced circuit technologies and to take a not-negligible share of the market, ... Then, the components plan is not ambitious enough. It would be necessary to triple, indeed quadruple, the investment; work out an overall strategy; concentrate the means of research and development; actually make a "Silicon Valley"* out of the Grenoble valley and around Elfcis. No longer to "receive" the technology from American firms ... but go to the United States to search it out while buying up specialized companies, as the Germans do and as CGE [General Electrical Company?] is trying to do, for months it has been negotiating the purchase of an American firm .... All these actions would still run the risk of being insufficient if they were not accompanied by a coherent policy of purchase and of participation in the basic research of the large circuit users (CII-Honeywell-Bull specifically).

It remains to be seen whether the authorities and the manufacturers concerned are ready to endow themselves with the means of satisfying aspirations.

---

*The "Silicon Valley" in California is the cradle of the world electronic components industry.

5586
CSO: 3102

PRIORITIES OF SOLAR ENERGY COMMISSION REVIEWED

Paris INDUSTRIES & TECHNIQUES in French 10 Apr 80 pp 84-87

[Article by M.-J. H.: "Habitat and Biomass Are COMES' Priorities"]

> [Text] Solar heating applications and making available the energy content of biomass--these are the priorities of COMES (Solar Energy Commission). Other sectors, however, are not neglected: the government intends to stress the development of photovoltaics and to promote at last the use of wind energy.

COMES, the Solar Energy Commission, is celebrating 2 years of existence. A budget of 152 million francs in 1980, growing by 30 to 40 percent a year, a staff which has grown from 3 to 50 persons--thus has it come of age. Its area of action has even been extended to biomass and wind energy. COMES' fixed objective is to achieve production from the sun of the equivalent of at least 15 million metric tons of petroleum by the end of the century. While this share represents only 5 percent of the French energy balance sheet, the young organization is, despite everything, called upon to play a growing role in the promotion of solar industry, an industry with advanced and highly exportable technology.

The Habitat and Green Energy

"The most significant contributions of solar energies, from now until the year 2000, will be furnished by applications of solar heating and of making biomass more valuable," according to Henry Durand, head of COMES. New measures have been taken to develop these two areas, but at the same time the photovoltaic sector will be strengthened.

The habitat enjoys a budget of 24 million francs this year. The aim for 1980 is to end up with the installation of 40,000 solar water heaters, or double the existing number. Some incentive measures were taken during the second half of 1979 (loans, standardization of equipment, training of erection craftsmen...). Others have just been decided upon: agreements will be made with construction firms; engineering firms will be put on the approved list to carry out preliminary studies required by the client, with costs shared by COMES; a test project bearing on solar heating of gymnasiums will be started; finally, numerous ministerial departments are preparing, in conjunction with COMES, programs of using solar energy in their buildings.

Another priority area, "green energy," could produce, as early as 1985, the [energy] equivalent of 6 million metric tons of petroleum a year and, without doubt, more than 10 million in the year 2000. This area will receive the largest share this year, 34 million francs.

In conjunction with the Ministry of Agriculture, the Agency for Energy Savings has been entrusted with the task of developing the use of firewood. COMES is assigned to develop other avenues for making our agricultural and forestry wastes more valuable: gasification, fermentation, transformation into liquid fuels. Several demonstration operations will be supported financially, and COMES' research budget has been multiplied by 5, making it 5 million francs.

Photovoltaics Is Progressing

In photovoltiacs, COMES foresees a financial effort of 28 million francs this year. This is very promising since the downward trend (25 percent observed last year) is continuing [in price of photo cells]. Recent months have witnessed the introduction of a major industrial device: In addition to RTC [expansion unknown], which has been manufacturing photovoltaic cells and modules for the past 20 years, three other companies have entered this field: France-Photon, a subsidiary of Leroy-Somer; Photowatt, a subsidiary of the CGE [General Electrical Company?], and Sahel, joint subsidiary of Thomson-CSF [General Radio Company] and American Exxon which, for the moment, is stressing system commercialization. Finally, Motorola is considering installing an assembly line in Toulouse. However, France still remains far behind the United States, where prices are customarily distinctly lower.

The policy conducted by COMES of grouping orders has permitted subsidizing several hundred photovoltaic installations during 1979; a great majority of them are in Africa and Polynesia. While 90 percent of the national production of modules and systems is exported, a national market is taking shape, for example, for the electrical supply of mountain huts and telecommunications stations.

Silicon Is Becoming Rare

An unexpected obstacle is appearing: silicon, a raw material for the modules, is beginning to be in short supply and its price keeps climbing. A gray market is even taking shape, offering silicon at double the official price. Faced with scarcity, COMES is undertaking an emergency program to obtain supplies for the national producers. Rhone-Poulenc and Pcuk may thus get started in this type of manufacturing.

The thermodynamic program continues to attract major efforts: 28 million francs in COMES' budget. It is centered on two projects: at Targassonne, where the Themis high-temperature power plant and power loop (work financed by COMES, the region, the department and EdF [French Electric Company]) are under construction, and at Ajaccio, where a solar power plant will start up at the end of 1980.

Wind Energy Remains To Be Exploited

As for wind energy: "It is regrettable," Henry Durand recognizes, "that nothing of note has been produced in France in this area." However, it appears that wind energy is competitive right now, on the one hand at isolated sites for small and medium power ratings and on the other hand making up the required difference for small diesel networks for wind energy installations of medium and large power ratings. To catch up, COMES proposes to launch a national plan based on two objectives from now to 1985: technological and commercial development of small and medium power wind energy installations; development of a very large wind energy installation.

The range of COMES' concerns is thus very great. It extends also to the training of university level technicians and to international cooperation. But at the same time its decentralization is being initiated, with the establishment of a procedure of solar activity planned in concert with local communities. The latter should be able to co-finance solar operations decided upon at the regional level.

For Henry Durand, "Money will not be lacking this year; any good project should find financing." Remember that.

5586
CSO: 3102

SOLAR ENERGY COMMISSION OBJECTIVES SPECIFIED

Paris SEMAINE DE L'ENERGIE in French 21 Apr 80 p 8

[Article entitled: "COMES Decides on Solar Hot Water Heater"]

[Text] The press conference just held by Mr Henri Durand, the head of COMES [Solar Energy Commission] again presented an occasion to specify the objectives of the government with regard to solar energy. The first item of news lies in the doubling of 50 percent of the 1981 budget of this organization which is at 152 million francs for the present year. The other item of news is a reorientation of its investment policies. In fact, COMES is less and less interested in the thermodynamic route and more and more in the introduction of solar water heating in the home. According to Mr H. Durand, the goal of 40,000 solar installations in 1980 is within reach; they will be added to the 20,000 existing dwellings. The hope of COMES is to reach 600,000 by 1985 and 1 million by 1990.

The price factor remains the keystone to this program. The government has put forth serious efforts in the form of aid and loans; 4,000 francs per single-family home to install a solar water heater and 3,000 francs for multifamily dwellings. In addition, a system of deductions from income for tax purposes has been set up, and the low-rent projects will be able to take advantage of the cancellation of the reimbursed down payment for new "all electric" dwellings if they are equipped with a solar water heater.

Finally, COMES is going to launch some "pilot" operations. Some 24 swimming pools will be equipped with solar water heating; likewise for gymnasium equipment.

9550
CSO: 3102

FRANCE

FRANCE-INDONESIA SCIENTIFIC, TECHNICAL COOPERATION

Paris AFP SCIENCES in French No 213, 3 Apr 80 p 3

[Report of State Visit by Indonesian Minister Habibie]

[Text] Paris--Scientific and Technical Cooperation Between France and Indonesia: during a three-day visit to France on the invitation of Pierre Aigrain, state secretary to the prime minister in charge of research, Dr J. B. Habibie, Indonesian Minister of Research and Technology, reviewed cooperation between the two countries with his French counterpart.

Mr Habibie, who had visited Spain, then left for Hamburg on 30 March after having visited the FRAMATOME (Franco-American Atomic Construction Company) facilities at Chalon-sur-Saone, where nuclear reactor vessels are being built, and the Bugey nuclear powerplant, in the Ain region.

In addition to Mr Aigrain, Dr Habibie also spoke with Rene Monory, Minister of the Economy, Andre Giraud, Minister of Industry, and Jean Francois-Poncet, Minister of Foreign Affairs, as well as with directors of the Atomic Energy Commission, of electronics and aerospace companies, and so on.

The State Secretariat for Research stated that "matters are progressing", and pointed out that a general cooperation agreement for scientific and technological affairs was signed in Djakarta on 8 May 1979 as the outcome of a 10-day trip by Mr Aigrain to Indonesia.

It now appears nearly certain that a French electronics company will be responsible for designing the electronics laboratory to be installed at the Puspiptek Applied Research Center which the Indonesians are installing 25 kilometers south-east of Djakarta.

Cooperation in oceanography should also become more specific when French oceanographic vessels cruise the Indonesian seas. It has been learned that the Indonesians are interested in the services which the future SPOT French remote detection satellite could perform in the economic sector, and that they would like to establish cooperation in the areas of cartography, geothermal power (Java is full of active volcanoes), wind power, and so on. The Indonesians are also very interested in a number of achievements of the French aeronautics industry.

Mr Habibie invited Mr Aigrain to Indonesia this year, and expressed the wish that mutual visits might take place yearly, in order to assure steady development of cooperation between the two nations.

In addition, on 2 April, a general agreement on nuclear cooperation was signed between the AEC and BATAN (expansion unknown) (see the "Atome" section for the text of this agreement).

11,023
CSO: 3102

FRANCE-MEXICO SCIENTIFIC, TECHNICAL COOPERATION

Paris AFP SCIENCES in French No 214, 10 Apr 80 p 5

["Cooperation/France-Mexico": Bulletin]

[Text] Paris--Visit of the Mexican State Secretary for Communications and Transportation: Miguel Angel Barberena, Mexican State Secretary for Communications and Transportation, came on an official visit to France where he met with Andre Giraud, Minister of Industry, on 8 April.

The Ministry of Industry indicated that talks centered on bilateral cooperation, notably in the areas of civil aviation, telecommunications, and railroad transportation.

Reliable Mexican sources reveal that a few weeks before the visit of President Jose Lopez Portillo, expected from 16 May to 18 May, Mr Barberena has been focussing on possibilities for French technical assistance in the area of electrification of railroads.

The state secretary visited the ballistics and airmail division of the Mureaux center, in the Paris suburbs, and notably the Ariane rocket-launching section. The first day of this official visit lasting until 12 April concluded with a dinner offered by Hubert Curien, president of CNES (National Center for Space Studies). (See AFP SCIENCES No 213.)

11,023
CSO: 3102

PROSPECTS FOR GEOTHERMAL DEVELOPMENT DISCUSSED

Paris SEMAINE DE L'ENERGIE in French 7 Apr 80 p 7

["New Sources of Energy" announcement]

[Text] The year 1980 seems a crucial one for this long-neglected source of energy. As a result of geothermal tests conducted in January 1980 at Melleray near Orleans (Loiret), BRGM (Geological and Mineral Prospecting Office) and the Interdepartmental Directorate for Industry of the Central Region organized a geothermal information day. For the past few years, prospecting over the entire area has shown that France is rather well endowed with this form of energy but that it does not yet make very good use of it: about 20,000 dwelling equivalents geothermally heated at present, whereas the United States has nearly 1000 MW installed, and other countries (the Philippines, Kenya, Indonesia, Chile, and so on) are now making a major effort to install such facilities. Mr. J. Cl. Colli, delegate for the Quality of Life, attended this program and presented an account of the government's efforts in the field of geothermal power. He indicated that "in the year 2000, there will be 1.5 million dwelling equivalents heated in this way, and geothermal power will represent 1 to 2 percent of France's total energy." Is this wishful thinking? Not according to the many projects now underway or under study. The most spectacular of these, geothermal drilling at Melleray, performed by BRGM for GIE Geoval (an association of flower growers and truck farmers), will provide heating for nearly 15 hectares of greenhouses and will allow a savings of 4000 t/per year. Investments will amount to 18 MF, with assistance from the EEC and the BRGM geothermal committee.

Drilling operations for home heating are under way in Dax and Jonzac. About ten operations are planned for 1980 at Cergy-Pontoise, Montgeron, Coulommiers, Strasbourg, Bourg-en-Bresse, Bordeaux, and elsewhere. Local communities are interested in these projects, which will benefit from the know-how of such public or private concerns as BRGM, SNEA (expansion unknown), Geoservices, Geochaleur, and so on. But drilling enterprises are not yet sufficiently well prepared to meet the growing demand.

These prospects should interest French industrialists, especially since there is an international market which is already dominated by the Ansaldo, Mitsubishi, and Toshiba companies. Opportunities are still available, notably in developing countries in Latin America, Indonesia, the Philippines, and the Mediterranean countries.

11,023
CSO: 3102

FIRST REPORT ON ACTIVITIES OF REORGANIZED CNRS

Paris LE MONDE in French 18 Apr 80 p 23

[Article by M.A.: "The New Administration of the CNRS Sets Itself the Task of Providing 'High Level Basic Research'"]

[Text] In September 1979, a profound reorganization of the National Center for [line missing, replaced by incorrect line duplicated from later in the text: the missions of the CNRS, and on the means which they have already or intend to...] administration team. A board of directors with 15 members, chaired by Mr Thibault, was assigned to define the overall policies. Their implementation was entrusted to Mr Jacques Ducuing, General Director, assisted in the administrative and financial administration by a secretary general, Mr George Roux, and surrounded by a number of scientific directors with competence in a particular area of research. A 16-member scientific committee, 10 of them elected, advises the general director.

The new administration informed the press on its first months of activity on Tuesday 15 April in Paris. They presented their views on the missions of the CNRS, and on the means which they have already or intend to put into effect to fulfill them.

According to Mr Ducuing, the primary mission of the CNRS is "to provide high level basic research in all areas." Not to do so would be serious, not only for basic research but also for applied research, since the latter rests upon the former. But this fundmentalist vocation should not bring along with it any ivory towerism, and Mr Ducuing states that "our work must stay upstream but take into consideration the major problems of our nation and be available to help solve them." The makeup of the board of administration of the CNRS, composed of scientists, "top-level" representatives of government agencies, and industrialists "exercizing important functions" facilitates the adaptation of the work of the CNRS to the expressed higher up; in the reverse direction, it helps inform the top administration and the economic sector concerning problems faced by a research organization.

Establishing maximum interconnections between the research and the other activities was one of the motivations behind the reorganization. More specifically, this is the task of the new director of external relations, Mr Wladimir Mercouroff. Collaboration with business will be developed--exchange of ideas and results--as well as the dissemination of scientific information; and to facilitate "people transfers," a "radiation" mission chief will soon be named to "implant in industry and in the decision making organizations scientists, selected from the best, who will enable other sectors of society to benefit from their experience." This might involve long-term duty assignments or definitive career changes. A second motivation behind the reorganization can thus be seen, that of increasing the mobility, both internal and external, of the scientists.

Decentralize

Another underlying idea was to decentralize the administration of the CNRS, and this task has been given priority treatment by the new administration. The number of administrative departments has been reduced from four to two (budget affairs, personnel and social affairs). A hundred people have left the central administration to go support the administrators assigned to the laboratories. These have had their responsibilities increased. Several have become secondary purchasing approval authorities, to avoid having certain expenditure committments have to go up to the central administration. This arrangement will be generalized throughout. Also in the process of reorganization is the management data processing bureau, "which had been the subject of numerous criticisms."

The scientific director teams will be supported by the naming of adjunct scientific directors. Finally, the administration hopes that the new regulations for engineers, technicians and administrators will improve the career perspectives by taking into consideration the qualifications achieved by these staff members by the very fact of their activities. Discussions on these regulations should begin in May between the office of the Secretary of State for Research and the labor unions.

9550
CSO: 3102

ROBOT USED FOR THREE-DIMENSIONAL CUTTING OF BODY PANELS

Paris INDUSTRIES & TECHNIQUES in French 30 Apr 80 p 37

[Article without byline, entitled: "Robot for Three-Dimensional Trimming"]

[Text] The Teilhol company, which make the Rodeo vehicle, uses a type IRb60 Asea robot for trimming body parts made of fiberglass-reinforced polyester.

This trimming was previously performed manually. Health and environmental problems arose and, after having determined various solutions, the company management selected the use of a robot.

Completely electric, this equipment which has five degrees of freedom is controled by an electronics rack with a microcomputer. It is capable of following any three-dimensional design with better than 0.5 mm precision (0.4 mm at a programmed point) and the programming is facilitated by use of linearization of its paths.

Located in a central position in a shop used only for the trimming, four customized supports are arranged around the robot. These supports are easily changed to meet production needs. More than 20 different types of parts are machined by this robot, with the capability for trimming four pieces of different types simultaneously depending on the size of the corresponding programs.

The operator only has to set up and remove the parts from their supports and check the quality of the work. The parts are held in place by suction.

At the end of the robot's wrist has been mounted an air-driven rotary tool holder. With a power of 750 W, its rotation speed is around 40,000 rpm off-load and 27,000 rpm under load.

The cutter is a special carbide miller, resharpenable, cooled by a water trickle. The main purpose for the latter is to collect the polyester dust.

This facility has enabled improving the quality of the work, by virtue of its great regularity, and also increasing productivity and improving work conditions.

9550
CSO: 3102

AERITALIA TO PRODUCE 30-50-SEAT MULTIPURPOSE 'COMMUTER'

Rome AVIAZIONE in Italian Mar 80 pp 123-124

[Article by Vito Tullio: "Perhaps an Aeritalia 'Commuter' by 1983--The AIT 230 Project"]

> [Text] Among the wave of projects for new III-level airline aircraft has appeared the Italian industry's proposal that could draw on the collaboration of national and foreign firms alike.

In the welter of typical brochures of preliminary draft plans appearing in the specialized trade journals, plans on paper of which perhaps one in a hundred will be realized, so few originate in the Italian industry that at first sight even the AIT 230 could be mistaken for a Boeing or McDonnell Douglas aircraft.

Aeritalia's vociferously announced "Commuter" has indeed made its appearance in much the same style as those publications that filter down from the marketing offices of American firms. This is perhaps the most recent evidence of the greater international approaches Aeritalia has made in the past few years. The Italian industry herewith declares its readiness to enter the market with a 30-50-seater aircraft designed for worldwide use today. Potential sales for machines of this class over the next 15 years are estimated in several thousands of units, and this is a sector of aircraft manufacturing in which programs in various stages of progress have already been undertaken by Americans, Canadians, Germans and Brazilians.

They all look to the "Commuter" in the first half-decade of the 1980's to supply at least two needs: the markets for metropolitan traffic such as in the United States (where deregulation is said to have opened up attractive prospects for the III-level services) and the developing countries, where the possibilities of air transportation have traditionally warranted use of similar aircraft.

Substantially, this aircraft fills in a third capacity category, after those carrying up to 15 and 30 passengers, which from general utility aviation on up are jointly in process of renovation. The deregulation policy initiated in the United States by the Carter Administration, under which the carriers have liberally redistributed their service routes, discontinuing stops considered insufficiently important and routes insufficiently profitable for conventional passenger aircraft of 100 or more seating capacity, thereby creating substantial hardship for some communities, has focused revived interest in the "Commuter," so much so that a recent investigation by BUSINESS WEEK showed among other things that the success or failure of the new American policy of "laissez-faire" liberalism will in part depend on the extent to which the III-level networks show themselves able to meet those needs, or in other words, "fill in the gaps" in the major domestic air transportation system. A more extensive meshing of a transportation network serving the major airports and warranting air transport over the commercially weaker routes remains among other things the commonly agreed upon objective of the world market, with possibilities of penetration widely diversified both by operational requirements and by geographical areas. The "Commuter" of the future appears as a versatile machine with innate adaptability to military or cargo versions, simple and economical, with costs of first acquisition and operation seriously competitive with products now on the market. This is, in short, a design born of the evolution of today's most advanced aerodynamic technologies, construction (composite materials), controls and on-board components. Moreover, the metropolitan "Commuter" should be a type of aircraft that does not need to tie up traffic systems in the major airports and thereby suffer in its performance and commercial appeal, thanks to area navigation procedures (R-Nav), microwave landing systems (MLS), separate accesses in cross-wind and STOL capability.

The Aeritalia AIT 230 is a turboprop, multipurpose aircraft planned for a payload of 3.5 tons or 30 passengers, for high density short hauls, in addition to cargo and military transportation versions. The design, according to the norms of FAR Part 25, stresses structural simplicity and low initial and operating costs. On the basis of seat/km by standard formulas, this aircraft rates between 15 and 40 percent more economical on flights of 500-750 km as compared to currently available 30-seat aircraft. Moreover the plane would have operating capability from "high and hot" runways and ones with semifinished surface (a consideration often raised in marketing the G-222), as well as independence of ground support services. The primary structure is to be designed for 4000 [as published] flights of 45 minutes duration. The engines are two PT6A-65 Pratt & Whitney turbines (P&W of Canada) fitted with 5-blade Hartzell propellers of 2.82 meters diameter. This version of a well-known family of turboprops supplies shaft power at a fixed point at sea-level (27°C) of 1173 horsepower, representing however only a provisional solution for a future "Commuter" until the availability of a new turbine in process of development by the same manufacturer to take the place of the PT6A series, to be known as PT7A. The operating unladen weight of the AIT 230 (passenger version) is 5670 kg and maximum weight at takeoff 9370 kg. The aircraft is over 16 meters long, wingspread 21.3 meters and wing surface 45 m^2. Among the principal performance characteristics are a cruising speed of 385 km/h at 6100 m. altitude, ascent velocity on two and one engines respectively 7.26 and 3.15 m/s, runway length prescribed by FAR 25 is 800 m.

This AIT 230 is to be a basic design modifiable in successive versions up to 50 passenger seats, firming up its prospects for winning a fringe of the market, for which, as mentioned, other projects are in the works: the British Short 330 (at present the only new 30-seater aircraft already in service), the DHC-8 (derived from De Havilland of Canada's DHC-7), the French AS35 (Aerospatiale), the CASA Series 200 (Spanish, a 25-seater) and the Embraer EMB-120, a Brazilian aircraft reverting to low-wing design; a not yet adequately defined project similar to the Canadian, French and Italian model has been announced by Beechcraft. Aeritalia makes its appearance among this variety of offerings and it is a foreseeable possibility that its presence in this company might be confirmed by some sort of agreement with a foreign partner, on whose identity one can only speculate. Might it be a European, or with different considerations in mind, American? A joint venture between Aeritalia, Fokker and Boeing with a touch of Japanese participation might be more than fantasy (assuring Fokker of Boeing's support on the F 29 and placing Aeritalia one way or another in position to recycle for its own account the technology acquired from the 767, while Boeing could launch the "Commuter" on the American market and Fokker, as a participant in the project, could market it in those regions that have acquired a taste for the F 27). What is certain is that Aeritalia has asked IMI [Italian Credit Institute] for funds in the form of easy-term credits and grants for the R&D phase of the "Commuter," the estimated total cost of which, according to some sources, is 60 billion lire. More concretely on the record is word of consultations between Aeritalia and the Agusta Group (to which SIAI Marchetti belongs) regarding a joint development agreement, and along with it a package deal between IRI Finmeccanica and EFIM [Manufacturing Industry Holding Company]. No doubt the technical and commercial experience from the G 222 and that acquired from progress in the work on the Boeing 767 (including the technology of composite materials) will give Aeritalia and, for other versions, its first Italian partner enhanced capability for realizing the new program. Contributions whose value is hard to judge were made to the AIT 230 by the cultural experiences of a number of Italian designers and technicians associated for a decade with Americans in the days of the never completed QSH and the world-wide marketing research performed for the G 222. The Chinese market could be especially important to this project as the Chinese have already shown interest in the "Commuter" in a symposium organized by Aeritalia in Peking. The AIT 230 could be in service by 1983.

Weights

Operational unladen weight (1)	kg	5670
Max zero fuel	kg	8981
Max takeoff	kg	9367
Max landing	kg	9276

Dimensions

Length, meters	16.35
Height, meters	6.00
Wing span, meters	21.26
Stabilizer span, meters	7.43
Wing surface, m^2	45.00
Undercarriage, meters	6.17
Nose landing wheel, meters	3.60
Volume, passenger cabin, m^3	30.70
Volume, luggage compartment (anterior plus posterior) m^3	1 + 3.5

Engines

2 Pratt & Whitney of Canada PT6A-65	
Power at fixed point on the post, flat-rated 27°C, CV	1173
Propellers, Hartzell 5-blade, diam. m 2.82	

Performance characteristics

Cruising speed at 6,100 m. altitude, in km/h	385
Ascent velocity (ISA) with two (one) engines, m/s	7.26 (3.15)
Maximum cruising altitude m	7000
Ceiling on one engine, m	3960
Runway length (FAR-25) m	810

(1) 5307 kg cargo version

2750
CSO: 3102

FIAT-ENEL ACCORD ON USE OF WIND ENERGY

Rome IL FIORINO in Italian 12 Apr 80 p 2

[Article by g. f.: "Sardinia, FIAT-ENEL Wind Power Station"]

[Text] An agreement between ENEL [National Electric Power Agency] and FIAT on use of wind energy. ENEL has concluded an agreement with FIAT which provides for the supply of 10 wind engines of 50 kw power. This order marks the most important phase of the ENEL project, called VELE (vento per l'elettricita [wind for electricity]), a program lasting many years for using wind energy, which is also Italy's first research program in this field. As part of the initial phase of Project VELE a wind power station of 500 kw will be constructed in Sardinia with the aforementioned wind engines.

In accordance with this agreement FIAT is starting production of a series of wind engines, the first of which will be tested by ENEL, and ultimately destined for the Italian and international markets. The wind engines, to be called ENEL-FIAT, were designed to make optimum use of the medium-to-light winds prevailing in our country. They are fitted with a two-blade rotor 13.5 meters in diameter, and will be manufactured by FIAT's Energy Sector through its affiliates "SES," FIAT Aviazione and FIAT Ttg. They replace a preceding model with a three-blade rotor currently under construction at FIAT Research Center for ENEL.

The equipment supply agreement between ENEL and FIAT calls for delivery of a basic prototype or preseries models which can be modified with respect to the basic model. The variations will be agreed upon between ENEL and FIAT to meet the requirements of the greatest number of possible applications in Italy and abroad.

ENEL expects important research data from the construction and operation of the experimental wind-driven power station in Sardinia.

Particular attention will be paid to safeguard the environment, on the assumption that it is possible to have the installation coexist with other users in the area (farming, industry, residential districts).

2750
CSO: 3102

RESEARCH COUNCIL OUTLINES FUTURE OBJECTIVES

Oslo AFTENPOSTEN in Norwegian 14 May 80 p 14

[Article: "NTNF: Research Must be Better Utilized"]

[Text] The Norwegian Technical-Scientific Research Council (NTNF) last year had an operation corresponding to a turnover of about 795 million kroner, paid by appropriations from four departments, from state lottery surplus and by educational operations. But Norway still does not utilize research and development as instruments in the areas of society in which NTNF functions to a sufficient degree.

Knowledge or ability to think fresh, based on scientific and technological understanding, are becoming increasingly important factors in the future development of society, says NTNF.

Last year, the department of industry granted about 193 million kroner to NTNF. These moneys are being used to support research and development operations within among other things industry and mining, construction and plants, shipping, ship building and interior transportation. The lottery moneys amounted to 49 million kroner and are largely being used in the same sectors. From the department of oil and energy NTNF was granted 98.2 million kroner--resources that were used for jobs within the off-shore and energy sector. Barely 17 million kroner from the ministry of municipal affairs and labor went to, among other things, research aimed at better working environment and to the project "Safety in Off-Shore Activities." The department for environmental protection granted 33 million kroner.

The portion of the total income of the NTNF institutes that came from educational operations was 57 percent in 1979. Measured by international standards, this is high for institutions of applied research, says NTNF. Industry accounts for the largest educational operation percentage-wise, followed by state and municipal departments.

From the long-range plan of NTNF it is obvious that the research areas within the province of the research council which will characterize the development most strongly will supposedly be electronics--especially microelectronics, technology for off-shore development, in particular deep water technology, technology of materials, branches of chemistry, in particular biochemistry, and the energy sector. The employment of micro process will have a strong influence on all branches of industry and management, particularly in a high cost country. Swift and effective use of the new gains in microelectronics will be decisive, it is said. But it is also pointed out that its introduction will also occasion societal problems, so that the pace at which it is introduced as well as the way it is introduced, should occur in a balanced manner.

The situation in the energy sector may be expected to lead to increased efforts for extracting deep water oil and gas deposits as well. Here work is being done on the edge of available technology and stronger international contributions may be expected in the areas which are relevant in this connection. For off-shore work in Norway this will be of decisive importance, says NTNF.

In the area of the technology of materials, NTNF considers that increased knowledge about problems of material will, in the long run, provide a flexibility which will be important to an efficient solution to some global resource problems. The strongest development in the chemistry sector is expected to occur in the area of biochemistry with important prospects for, among other things, food supplies and the foodstuff industry, for pharmacy, and also as providing a basis for improved control of environmental problems and for the utilization of resources.

The programs drawn up by the long range planners have as their goal to contribute research and development operations having more of an input into the development of society, it is said. A somewhat larger growth in the NTNF sector than what is expected to be the average growth in the gross national product has been suggested.

9542
CSO: 3102

NEW GAS TURBINE USES CERAMIC PARTS

New Turbine Design

Stockholm NY TEKNIK in Swedish 24 Apr 80 p 39

[Article by Peter Palmkvist]

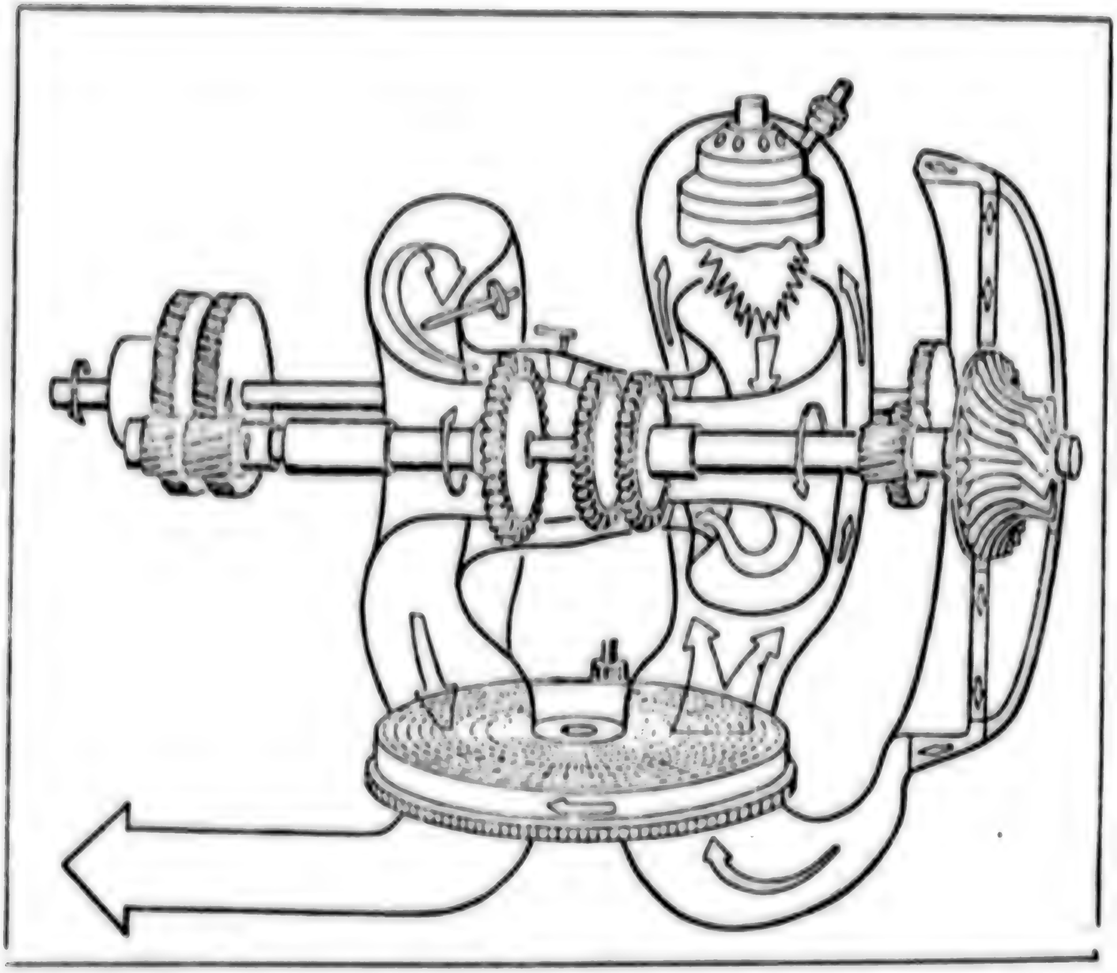
> [Text] A gas turbine system that may mean a breakthrough for gas turbine motors in automobiles is being developed at Malmö. The development is being done at the United Turbine plant, which belongs to the Volvo concern. There has been cooperation for a number of years between United Turbine and ASEA [Swedish General Electric Corporation] on development of the ceramic turbine wheel that will be introduced as the work goes on. "The stricter demands for fuel economy, cleaner exhaust gases, and all-fuel properties all tell in favor of the gas turbine. It will be introduced on a broad front in the 1980's and 1990's," says Prof Sven-Olof Kronogård, inventor of the new three-axled gas turbine motor.

Among the world's automobile manufacturers there has been an interest in the gas turbine since the beginning of the 1950's. But it has increased strikingly in very recent times. Besides Volvo-United Turbine, Daimler-Benz, Volkswagen, General Motors-DDA, Chrysler, Ford-Garett, Toyota, and Nissan are betting heavily on turbine propulsion.

In military land vehicles there are already gas turbine motors.

"The Swedish Tank S was the first in the world, 15 years ago," says Prof Kronogård, who was responsible for its turbine motor system.

For the future we can expect turbine propulsion to take over parts of the market from piston engines in the case of trucks, busses, and passenger cars. That by the end of the 1990's 30 percent of the new passenger cars



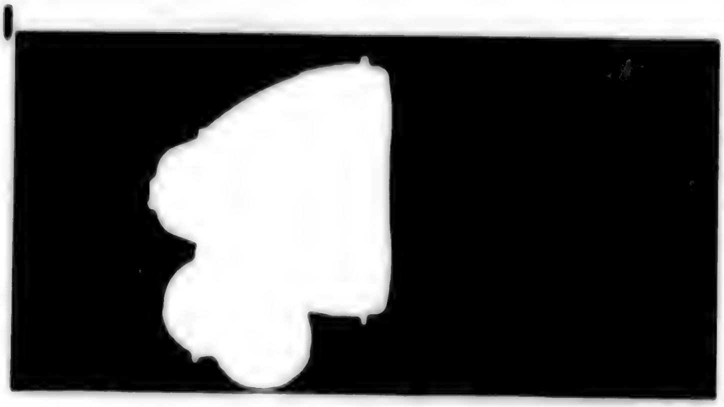
The KTT turbines contain a third axle and a third turbine. This auxiliary turbine is connected via a planetary gear with both the gas generator and the outgoing axle, and can supply power to both units.

being produced will have gas turbine propulsion, according to Prof Kronogård, is not an unrealistic estimate.

Many Advantages

The reason is the many advantages the gas turbine motor has compared with conventional piston motors. The most important are:

- Cleaner exhaust gases.
- Lower fuel consumption
- The possibility of using various fuels--liquid and gaseous.
- Low weight in proportion to power.



Here is a size comparison between a straight six-cylinder motor with automatic transmission and the gas turbine.

- Long life due to few moving parts exposed to wear.

- Minimum maintenance.

- Good moment characteristics simplify the gearbox.

- Quiet, vibrationless running.

- No cooling system is needed.

The gas turbine motors hitherto designed for vehicle propulsion have two turbines on each axle. One drives the compressor and the other the outgoing axle, which drives the vehicle via the gearbox.

Simple Principle

The working principle is simple. Air is drawn in and compressed in the compressor. The air is then heated with exhaust-gas heat in a heat exchanger, and then goes to the combustion chamber. There fuel is sprayed in, and it can be, for example, gasoline, kerosene, diesel oil, heating oil, methanol, gas, or pulverized solid fuel. The gas mixture that forms in the combustion chamber is ignited, and the pressure of the hot combustion gases is used to drive both turbines.

The secret of the new KTT motor (KTT means Kronogård Turbine Transmission) --a turbine motor with integrated transmission--is that a third turbine is introduced on a separate axle.

This turbine, which is coupled to the other two via a planetary gear, makes use of the power that would otherwise be lost in the exhaust gases. The power is transferred by means of the planetary gear to the other two turbines. The third turbine thus functions as an auxiliary to the others.

"This arrangement gives tangible advantages," says Sven-Olof Kronogård.

"We get higher power per kilogramm and can thus build the motors smaller with the same power output. That means lower weight of the vehicle, which in turn reduces the power needed.

"The motor also gets such good traction power throughout the rpm range that in most cases it is possible to get along without a gearbox. The transmission is thus built into the motor, which gives continuously variable gearing throughout the operating range."

Low Fuel Consumption

The double recovery of exhaust gas energy via the auxiliary turbine and moment conversion losses via the heat exchanger opens up entirely new possibilities for low fuel consumption.

Another important advantage is that the KTT system--because of lower stresses in the turbine wheel--opens up new possibilities of using ceramic material in these parts. That offers a chance of further improving the power output and consequently the fuel economy. What is decisive for this is how hot the gas is when it runs through the turbine. The higher the temperature the greater power can be obtained and the better the efficiency and the fuel economy become.

But metal parts in the turbine do not tolerate unlimitedly high temperatures, and purely for reasons of materials one cannot go higher than about 1,050°C today and possibly 1,200°C in the long run. Ceramics, on the other hand, would allow temperatures up to about 1,300°C relatively quickly and about 1,650°C in the long run.

Successful Experiments

"Ceramics do not have as good tensile strength as metals. But in the KTT system the turbines can be made smaller and be operated at lower peripheral speed for a given power output than in a conventional gas turbine motor. This reduces the streeses, and the possibility of introducing ceramics at an early stage increases."

Successful experiments at United Turbine and other turbine firms indicate that not only heat exchangers--which have already tested out well in ceramics--but also combustion chambers and other stationary parts can be made of ceramic material.

Today there is a KTT prototype of about 150 hp mounted in a Volvo 264 in Malmö. Thus far the automobile has not been operated in traffic, but it has been tested in a "chassis dynamometer" and has run norstop for a distance corresponding to New York-Los Angeles. At the beginning of next year a number of additional KTT motors will be assembled at Malmö. There is still a great deal of development work to be done, but manufacture on a large scale may get under way toward the end of the 1980's.

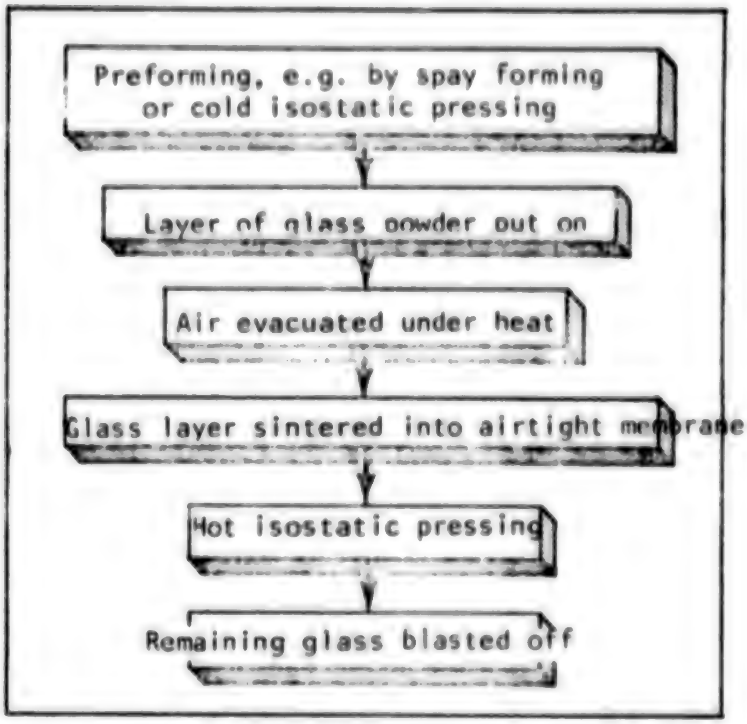
"Ten years later, i.e. in the year 2000, it is estimated at the U.S. Department of Energy, about 8 million vehicles, or 27 percent of the new cars, may be equipped with gas turbine motors. That would lead to an oil saving of over a million barrels a day!"

Ceramics Process

Stockholm NY TEKNIK in Swedish 24 Apr 80 p 40

[Article by Erik Mellgren]

> [Text] ASEA is leading Swedish development of high-temperature ceramics. In the Robertsfors high-pressure laboratory a turbine wheel has been made of silicon nitride sintered by hot isostatic pressing.
>
> By ASEA's technique it is possible to make even thin, complicated parts of adequate strength. The blades of the turbine wheel exhibited by ASEA a few weeks ago are as thin as 0.3 mm at the back edge.


Preforming, e.g. by spay forming or cold isostatic pressing
Layer of glass powder put on
Air evacuated under heat
Glass layer sintered into airtight membrane
Hot isostatic pressing
Remaining glass blasted off

The different stages in the ASEA method for isostatic pressing of ceramics.

The turbine wheel for United Turbine's new motor can be manufactured by ASEA's high-pressure method. The lighter, somewhat bigger wheel shows the appearance after preforming. After the hot isostatic pressing under high pressure and high temperature the silicon nitride powder sinters together into a finished wheel completely without pores in the material.

The development has taken place at ASEA's laboratory in Robertsfors, the same laboratory that developed another ceramic product that received widespread notice--the aluminum oxide capsules designed for final storage of highly active waste from nuclear power plants.

Isostatic pressing involves placing the material to be pressed in a container with a gas as pressure medium. When the gas is compressed the future turbine wheel or whatever it may be is subjected to a pressure that is uniformly distributed over the whole surface.

But for this method to work on porous material the objects to be pressed must be provided with a gas-tight membrane.

Rubber and Glass

In cold isostatic pressing, rubber forms can be used. But at the high temperatures--about 1,700°C--used in ASEA's processiig, glass is used as a gas barrier.

Experiments have been done in the United States in the past with hot pressing of high-temperature ceramics. But in those experiments ordinary presses were used which did not give the same uniformity as isostatic pressing. There were irregularities in the material. The method was also expensive; a conventional press accommodates only one or a few parts at a time, and the sintering time is relatively long--it may take several hours for certain materials.

In isostatic pressing, on the other hand, in theory the press is packed full of preformed parts. In ASEA's method, moreover, the pressure used is an order of magnitude higher than in hot pressing in ordinary presses.

Simple Forming

Since the final sintering is done under pressure, the preforming can be done without any requirement that the material shall be entirely free of cracks. An advantage that may make up for the fact that the sintering itself must be done with considerably more costly equipment than an ordinary high-temperature oven.

Examples of methods of forming are spray forming, casting, and cold isostatic pressing of objects that are processed later.

In the first experiments when ASEA was in the test specimen stage, separate glass ampoules were used as gas barriers around the ceramic powder. But this was not suitable for preformed parts. ASEA's new method is based on coating the preformed components with a layer of glass powder and putting them in the isostatic press.

High Pressure, High Temperature

In a first stage the temperature is raised at the same time that the air is evacuated through the still porous glass envelope. After the evacuation the temperature is raised still higher to close the glass envelope completely.

The next stage is the actual pressing, which is done at very high pressure and high temperature.

A special treatment during the concluding phase in the press when the temperature and pressure have dropped again contributes to removal of the layer of glass. The last remnants are blasted off afterwards.

8815
CSO: 3102

COMPANIES DISCUSS CAD/CAM EXPERIENCES

Stockholm NY TEKNIK in Swedish 17 Apr 80 pp 38-39

[Article by Hans Werner]

[Text] The big rationalization wave from workshop floors has now reached the country's design offices. Seven big enterprises have installed CAD/CAM systems, costing from 1 to 3 million kronor each. Smaller enterprises are asking, with interest, when such "electronic drawing tables" will become available at lower investment costs.

The seven big enterprises discussed their CAD/CAM experiences at a seminar held, some time ago, by the Swedish Association of Metalworking Industries. The seminar showed that the emphasis, so far, is being placed on coupling to NC machines i.e. CAD/CAM systems are being used, first, for making drawings and, subsequently, for APT programming of the programming tapes for NC machines in workshops.

CAD Systems Versatile

However, many more aspects of the work of design offices and the preparation coupled with it can be performed by means of CAD equipment (Computer Aided Design). Dick Sears of Volvo Trucks, Inc., showed how CAD enters into the whole chain:

1. Development of design basis.

2. Preparation of design draft.

3. Design analysis, both with regard to calculations and optimizations. (In the case of Volvo, the two functions are not incorporated in the CAD equipment but in Volvo's big computer system.)

4. Analysis of test results.

5. Computer aided drafting.

6. NC preparation.

There is an obvious lack of systems consultants to assist at least smaller enterprises in selecting CAD equipment. That is why the participants listened especially attentively to what the users had to say about the situation at Kockums, Saab-Scania, Sandvik, Stal-Laval, LM Ericsson and Volvo Trucks. Also the new arrival in the CAD field, Electrolux, had to answer questions.

Consumer Information Sought

The need for consumer information in the area was thus confirmed. Together with the Institute for Engineering Research, the Swedish Association of Metalworking Industries, therefore, plans to publish, in May-June, a list of equipment offered by the CAD market.

It appeared from the debates that the hitherto normal way of introducing CAD technology is to form small project groups. These will, subsequently, teach the methods to the design engineers of their own enterprises.

Kockums was an early starter, which, according to Kjell Danielsson, started looking at CAD in 1975 and, the following year, procured equipment with three display terminals. The natural point of departure was that the enterprise in question already had numerically controlled burners.

The result of CAD technology is better utilization of raw materials--ship plates, a 60 percent saving of time, and the start of a data base with product descriptions. An essential aspect of the advance of the CAD system is that it gives short answering intervals and has a vast store.

Seldom Turn-Key

Turn-key CAD/CAM systems are seldom ready. The user must do the adjustment work. This was demonstrated not least by Lars-Åke Furingsten of Saab-Scania. There, they have had to make changes in the CAD system for three reasons:

Achieving integration with other systems, adapting to own standards and incorporating different functions to obtain rationalization gains. The gains in this case have been shorter throughput times, better reproducibility, a higher degree of accuracy, lower costs, and less use of staff.

The advice given by Furingsten was to start with a low hourly debit charge (if internal debiting is to be applied) for the design engineers who make use of the CAD equipment. For the hourly charge is important to direct the use toward something which clearly has a rationalizing effect to the enterprise as a whole.

At Volvo, the cost was put at 176 kronor/hour, which ought to be representative. There, the design engineers have, moreover, been given a standard list from which to choose functions and, in addition, a user manual which has not been written in datamatics but in ordinary Swedish.

Sandvik Expands CAD System

While Volvo has placed its display terminals in the work environment, the majority of other Swedish users have arranged separate rooms, with up to four working places in each room. This was done by Sandvik, which now, according to Lars Bentzer, expects in 1981 to double its CAD terminals to 16 terminals.

Sandvik's way of working with the CAD equipment gives big time gains. The reason is that a design engineer there usually puts on the data screen an earlier drawing and modifies it. The new one may then be drawn on the drawing machine at the rate of 46 m/min.

In some cases, the drawings are made on films, which, subsequently, are filled with Indian ink. Such frames are used in the quality control of details (carbide tips and their holders, etc.).

Increased Accuracy

Of approximately 40,000 drawings at Sandvik, between 500 and 1,000 drawings today are in the CAD machine. The design engineers are now making great endeavors to put a larger number of CAD drawings into library data systems or into a large data system, in order, in this efficient manner, to recall desired,older drawings.

The experience of Sandvik is that the CAD system gives much greater accuracy, simpler maintenance of a design (the alteration service is made automatic) and, moreover, has a more rapid throughput from idea to final product.

Lars Bentzer gave the following advice:

1. Make accurate preliminary studies, with design engineers and data people as participants.

2. Visit producers and users of CAD systems and take along authentic jobs for testing.

3. Keep all permanent users informed about what happens from the very beginning.

This advice was, at least, not taken by the management at Electrolux. They here put in a CAD equipment a short time ago without informing the design engineers concerned. They, therefore, have adopted a more cautious attitude than in other places.

Faster NC Control

Typical ways of using the current Swedish CAD installations, judging from Stal-Laval and LME, are close coupling to NC programming. According to Ulf

Simmons at Stal-Laval, the time distribution for NC programming before the introduction of the CAD/CAM equipment was:

20 percent method determination,
14 percent tool choice,
47 percent sketches and source programs,
10 percent data processing,
18 percent control and correcting,
11 percent documentation.

Of this, with the exception of correcting, everything is now being done by the CAD/CAM program. At the disposal are three terminals with 100 percent availability and 85 percent use of design engineers. The throughput from idea to finished turbine shaft, or some other detail drawn, is now 1 1/2 weeks, on the average. The number of programs for NC machines will, this year, reach approximately 1,500 programs, according to a current prognosis.

While Sandvik makes many similar details, the batch size for turbines averages 1.6.

Several Construction Alternatives

TO LM Ericsson's telephone exchange division, which is one of several CAD users within the enterprise, the goal with the CAD equipment obtained last year is to achieve:

1. A higher degree of accuracy;

2. A shorter period of construction, or several design alternatives;

3. A simplified alteration process;

4. Increased responsibility on the part of design engineers in the entire construction process, and

5. The possibioity of developing a graphical data base. In such a data base, information regarding individual drawings may be stored at many levels, for example, parts lists and texts in different languages.

To sum it up, the experience with "turn-key" CAD/CAM systems is that none of them is completely ready. It always has to be adapted to the technical-administrative system of the individual enterprise. So far, this has been accomplished only partly by the biggest enterprises.

In the early summer, the seminar will be followed up by a study trip to the United States. It is primarily from that country that the CAD/CAM system comes.

7262
CSC: 3102

SAILING SHIPS MAY MAKE A COMEBACK

Stockholm NY TEKNIK in Swedish 3 Apr 80 pp 6-7

[Article by Harald Nerman]

[Text] Malmo--The project division of Kockums has made preliminary studies of a sailing cargo ship of 80,000 tons dead weight.

Developmental work is being done on sailing ships all around the world. The work has been intensified due to the soaring oil prices and the difficulty of obtaining oil of a suitable quality for operating a ship.

Chief engineer Kjell Restad is head of the Kockums project division.

"Our work is quite serious but we have not yet reached the construction stage."

West Germany is working on the "Dynaship" project, while in Japan Nippon Kokan KK has tested a combination engine-sail on a 23 meter test boat. Sketches of ideas have been presented in the Soviet Union and the U.S. Maritime Administration is studying the possibilities of building efficient sailing vessels.

Fuel Prices High

Bunker C oil costs 700-1000 kronor per ton today and the price is rising steadily: fuel will be an increasingly significant part of operating costs in the shipping industry.

Engine developments today are going in the direction of diesel operation which uses 20-25 percent less fuel than turbine operation.

The ship Kockums is working on is a seven-masted cargo ship of 80,000 tons dead weight. Instead of engines producing 12 MW the sailing ship needs only 1.5 MW for maneuvering and for use when winds are light.

With a bunker price of around 1000 kronor a ton for oil a sailing ship would cost about 50 million kronor more than a conventional engine-powered cargo ship. This is not an indication of the real cost of a sailing ship of this size. Average speeds of 12 knots and equal freight loads were assumed in figuring the 50 million kronor that would be an acceptable excess cost.

Many Problems Still Remain

Restad: "Our work is very preliminary and is mainly a basis for deciding on continuation of the work. The project may be of such a size that several interests should cooperate on it."

And there are many questions and problems. What materials should be used for the sails? How will the sails be handled? Where will the masts be attached and how will they turn? Everything must be done mechanically.

How will the ship take on cargo? How can the loading apparatus be constructed and where can it be located on deck? Which routes and ports would be suitable?

It seems likely that the ship must be a large one, built for long routes. Bulk cargoes are most likely: grain, coal, iron ore, etc.

Cargo Must Tolerate Delay

Since it can be hard to stick to timetables a sailing cargo ship should be intended mainly for cargoes that are not perishable--and preferably not too expensive, since time delays lead to interest losses.

The estimated average speed of 12 knots over longer distances is based on many wind observations in the North Atlantic. The same speed has been used on a preliminary basis in England for sailing to Australia. More wind measurements over longer periods of time are needed along the routes that might be involved.

Note: Tons dead weight refers to a ship's cargo capacity and includes in addition to actual cargo the weight of provisions, fuel, passengers and crew.

A ship's volume is measured in register tons. 1 register ton = 100 cubic feet = 2.83 cubic meters.

6578
CSO: 3102

END

END OF
FICHE
DATE FILMED

Feb. 2 1981